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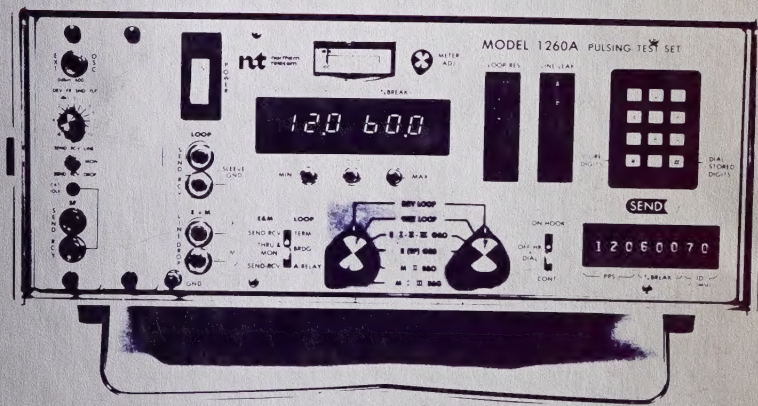
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MODEL 1260A

PULSING TEST SET

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SECTION 1

GENERAL DESCRIPTION

1.1 This manual describes the Northeast Electronics Model 1260A Pulsing Test Set. The test set is a precision digital instrument designed to send, receive, and measure pulsing in multiple loop and/or E&M modes. The sending and receiving capabilities are fully independent so mixed modes can be used. . .for example, sending loop while receiving E&M, or vice versa.

1.2 The send section transmits continuous pulsing, or any number of dialed digits. And user-programmed number up to 16 digits long, can be automatically dialed or redialed as desired. Digits are entered via a front panel keypad. Outputting speed, percent break, and interdigital time are precisely variable over wide limits to permit easy, but exact margin testing. Selectable loop resistance and line leak networks are built-in for convenient loop simulation and margining as needed.

1.3 The receive section automatically measures the speed, percent break, and minimum interdigital time of received pulsing. No pre-measurement calibration is required. Measurement results are displayed on a digital readout.

1.4 The Model 1260A gives its user the following measurement data:

- average speed and percent break over multiple pulses in a string;
- minimum speed and percent break for pulses in a string (slowest speed and lowest percent break);
- maximum speed and percent break for pulses in a string (fastest speed and highest percent break);
- total count of all pulses received for multiple pulses/digits in a string;
- minimum interdigital time for digits in a string;
- display of each individual digit received and the actual interdigital time following that digit.

1.5 The minimum and maximum data helps reveal common signaling problems arising from individual pulse defects. These include: (a) first pulse problems from A-relays, (b) split (double) pulsing and other erratic relay operations; (c) intermittent signaling conditions of other types.

1.6 The 1260A's readout shows the test results with much the same "feel" as an analog meter. And, the small analog meter included enhances this effect. The meter directly indicates the on and off hook status to show idle/busy and wink or delay dial conditions. . .plus short term percent break variations and longer term signaling dropouts. Meter indications are exactly the same for both loop and E&M operation.

1.7 TYPICAL APPLICATIONS

1.8 The Model 1260A can pulse test both signaling and switching equipment. It has the capabilities needed for:

- acceptance testing of new plant;
- routine and margin testing of in-service plant;
- trouble sectionalizing;
- alignment/tune-up adjustments.

1.9 The 1260A's operating control arrangement simplifies the task of exercising circuits over their ranges of sectional and end-to-end signaling requirements. Margin limits tests for speed, percent break, interdigital time, leak, and loop resistance can all be performed using the 1260A's built-in features.

1.10 The 1260A is also suitable for pulse testing/tuning a variety of signaling and switching components such as:

- registers and senders;
- pulse repeaters;
- pulse correctors;
- loop to/from E&M converters;
- switch train components . . . digit absorbing selectors, regular selectors, connectors, and related equipment.

1.11 The instrument's ability to display each received digit and the interdigital time for that digit is particularly useful in identifying problems associated with senders, repeaters, and similar equipment. And, the independent send and receive functions permit easy checks on the accuracy of many signaling converters. That is, exact input-to-output comparisons can be made on loop to E&M converters and so forth.

1.12 Dynamic testing can be performed on A-relays under realistic conditions which closely approximate those existing in service.

1.13 In many cases measurement can be made on a bridging basis under actual in-service conditions. Pulsing in the presence of a contact suppression circuit, with up to $2\mu\text{F}$ of short capacitance, eliminates the need to unsolder networks.

1.14 TEST MODE SELECTION

1.15 The independent send and receive sections handle the following types of signaling arrangements:

- dry loop;
- wet loop, (battery and ground);
- E-lead ground and open;
- E-lead ground and battery;
- M-lead battery and open;
- M-lead battery and ground.

1.16 For wet loop pulsing, the 1260A makes/breaks both sides of the line. This is an important factor in some applications. A convenient test A-relay in the 1260A is easily substituted for an in-circuit A-relay when required by loop testing practices.

1.17 For E&M testing at 6-wire and 4-wire patch bays or other access points, the 1260A's internal design makes it possible to easily select the proper conditions for sending/receiving in either the line or drop directions. Idle/busy status indicators and a reverse direction busy-out feature are also built-in for E&M testing.

1.18 SEND SECTION

1.19 The Model 1260A has a precision, crystal-controlled oscillator as the master reference for all outpulsing. Outpulsing speed is variable from 1 to 29.9 pps in 0.1-pps steps. Percent break is adjustable from 10 to 89.9 percent in 0.1-percent steps.

1.20 Selected speed and percent break values apply to all outpulsing. . . whether continuous, or single-digit, or multi-digit. Selectable leak networks (normal, A, B, C, D, D1, SF1) and loop resistance (0 to 6300Ω , 10- Ω steps) can also be imposed on outpulsing in loop modes.

1.21 RECEIVE SECTION

1.22 The speed measurement of received pulsing has an accuracy of ± 0.1 pps over a range from 4 to 29.9 pps. The percent break of received pulsing is measured with accuracy of ± 0.5 percent over a range of 10 to 89.9 percent.

1.23 Fully accurate measurements can be made on the last digit greater than one. With continuous pulsing the minimum interdigital time as well as the minimum/maximum, the average speed, and the percent break are continually updated and available for display. The total number of pulses received in a stream, up to 999, can be counted and displayed. Dialed digits received and their associated interdigital times up to 16 digits are also retained and displayed.

1.24 Measurements may be made on a bridging basis or on a terminating basis.

1.25 INPUT POWER (DC)

1.26 The 1260A operates from -48 Vdc at 1 ampere maximum. Power is applied through a 310 jack in the side of the unit when used as a portable unit, or a terminal strip in the rear of the unit when the unit is rack mounted. A combination on/off power switch, indicator light, and resettable circuit breaker is located on the front panel.

1.27 AC POWER OPTION

1.28 A field installable ac to -48 V power module that eliminates the need for a -48 Vdc battery source is available for the 1260A. A switch selects either 117 Vac or 234 Vac input power. The ac power to the supply is fused on both sides of the line. Power is applied through an ac power cord plugged in at the rear of the 1260A.

1.29 SF MODULE

1.30 A plug-in send/receive SF module adds 2600 Hz SF signaling capability to the basic Model 1260A. The SF send level is set automatically to an appropriate nominal TLP level depending on the application (refer to Table 2-3). A panel control permits deviation from nominal levels over an 18-dB range, useful for testing SF receivers to the margin limits of their detection sensitivities.

1.31 For applications where required, the module can be conditioned to send 2400 Hz SF signaling by means of an internal switch. An external oscillator jack permits sending of other SF tones.

1.32 The receive section converts the SF tone pulsing to the dc pulsing needed to drive the 1260A's measuring circuits. The receiver circuitry recognizes both continuous 2600 Hz SF tone (on hook condition) and 2600 Hz pulsing. The ability to receive SF tones other than 2600 Hz is internally selectable.

1.33 TYPICAL SF APPLICATIONS

1.34 Aside from enhancing existing capabilities (see paragraph 1.7) the SF module provides for the testing/tuning of several other signaling and switching components such as:

- SF senders and repeaters;
- loop-SF converters
- E&M-SF converters

1.35 TEST MODE SELECTION

1.36 This module provides a convenient method for SF testing. By setting the proper mode dial on the 1260A and plugging into the matching mode jack on the SF module, SF pulsing can be sent or received. Also, the independent send and receive sections allow signaling tests in any send-receive combinations of loop, E&M, or SF.

1.37 SF SEND SECTION

1.38 A Wein-bridge type oscillator, gated by the crystal-controlled oscillator in the 1260A, produces the SF pulsing. Outpulsing speed can range from 4 to 14 pps ± 0.2 percent.

1.39 A dial allows SF transmission deviations from the nominal TLP level by a range of +1 to +7 dB's in 2 dB steps and -1 to -11 dB's in 1 dB steps.

1.40 An internal switch defeats the SF augmentation turn-off delay.

1.41 SF RECEIVE SECTION

1.42 The module receives SF pulsing over a range of 4 to 14 pps ± 0.1 pps. The percent break extends from 10 to 89.9 percent break with ± 2 percent accuracy but ± 1 accuracy within the 50 to 75 percent break range.

1.43 Measurements may occur on a bridging or terminating basis.

1.44 INPUT POWER

1.45 The SF module plugs directly into the 1260A and is driven by the mainframe.

SECTION 2

SPECIFICATIONS

2.1 Table 2—1 lists the specifications for the Model 1260A Pulsing Test Set.

Table 2—1. Model 1260A Pulsing Test Set Specifications

SEND SECTION

Speed

Range:	1.0 to 29.9 pps
Resolution:	0.1 pps
Accuracy:	±0.1 pps

% Break

Range:	10 to 89.9% break
Resolution:	0.1% break
Accuracy (Wet Loop):	±1.0% break
Accuracy (All other modes):	±0.5% break

Interdigital Time

Range:	10 to 999 msec.
Resolution:	10.0 msec
Accuracy:	±0.2 msec

Loop Resistance

Range:	0 to 6.3 k Ω
Resolution:	100 Ω
Accuracy:	±1.5%

Line Leak Networks:

Normal, A,B,C,D,D1, and SF1

Pulsing Relay:

Mercury-wetted contacts, internally fused at 1 ampere

Outpulsing

Continuous:	Used to continuously outpulse at speed and % break set on thumbwheels.
Keypad:	Used to outpulse selected digits (0 through 9) at speed, % break, and interdigital time set on thumbwheels.
Memory:	Used to outpulse stored digit stream of up to 16 digits at speed, % break, and interdigital time set on thumbwheels.

Table 2—1. (Cont'd)

RECEIVE SECTION**Speed**

Range: 4 to 29.9 pps*
 Accuracy: ± 0.1 pps*

% Break

Range: 10 to 89.9% break*
 Accuracy: $\pm 0.5\%$ break*

NOTE

The speed affects the percent break range.
 See Figure 4—3 for clarification.

Measurement Type

Dialed Digit Input: Averaged over last digit greater than one.
 Continuous Input: Averaged over each 10-pulse group received.

Interdigital Time

Range: 250 to 999 msec
 Accuracy: ± 2.0 msec

Pulse Count

Range: 1 to 999 pulses

Digit Memory

Capacity: 16 digits
 Display Method: Recalls and displays one digit at a time starting with first digit received.

Input Impedance

Bridge or Monitor: Loop and E&M both $> 20\text{ k}\Omega$
 Termination: Loop equals 400Ω
 E&M $> 4\text{ k}\Omega$
 A-Relay: Loop mode, 221A type pulsing relay

POWER INPUT

CO Battery: -42 to -56 Vdc at 1 ampere maximum
 AC Power Option: Refer to Table 2—2

OPERATING ENVIRONMENT

Temperature: 0° to 50°C (32° to 122°F)

Relative Humidity: 0 to 75% non-condensing

DIMENSIONS

17 in. w x $7\frac{1}{2}$ in. h x 13 in. d
 (43.2 cm w x 19.1 cm h x 33.0 cm d)
 (Adapter supplied for mounting in 19 in. or 23 in. racks)

WEIGHT

14.0 lbs (6.4 kg)

* Not measured through A-realy.

2.2 Table 2—2 lists the specifications for the AC power option to the Model 1260A Pulsing Test Set.

Table 2—2. AC Power Option Specifications

Voltage:	117 or 234 Vac $\pm 10\%$
Frequency:	50 or 60 Hz ± 3 Hz
Current:	0.5 amperes
Power:	Approximately 50 watts

2.3 Table 2—3 lists the specifications for the SF module to the Model 1260A Pulsing Test Set

Table 2—3. SF Module Specifications

SEND SECTION

Speed	
Range:	4.0 to 14.0 pps
Accuracy:	± 0.2 pps
% Break:	
Range:	10.0 to 89.9% break
Accuracy:	$\pm 0.5\%$ break
Interdigital Time	
Range:	250 to 999 msec
Accuracy:	± 3.0 msec
Frequency:	2600 Hz ± 15 Hz, (internal switch allows selection of 2400 Hz)
Fixed Levels (dBm 600 ohms)	
Toward Line, On-Hook:	-36 dBm
Toward Line, Pulsing:	-24 dBm
Toward Drop, On-Hook:	-13 dBm
Toward Drop, Pulsing:	-1 dBm
Level Control:	+1 to +7 dB above fixed level in 2 dB steps -1 to -11 dB below fixed level in 1 dB steps
Level Accuracy:	± 1 dB
Source Impedance:	600 Ω balanced
Distortion:	<1.5% THD
Balance:	>50 dB at 2600 Hz
DC Blocking:	300 Vdc minimum
Return Loss:	>21 dB (200 to 3500 Hz)

Table 2—3. (Cont'd)

RECEIVE SECTION

Speed

Range: 4 to 14 pps
 Accuracy: ± 0.1 pps

% Break

Total Range: 10 to 89.9% break
 Accuracy: $\pm 2.0\%$ break
 Normal Operating Range: 50 to 75% break
 Accuracy: $\pm 1.0\%$ break

NOTE

The speed affects the percent break range.
 Refer to Figure 4—3 for clarification.

Interdigital Time

Time: 250 to 999 msec
 Accuracy: ± 3.0 msec

Bandwidth

2600 Hz: Must operate 2600 Hz ± 30 Hz
 Must not operate 2600 Hz ± 100 Hz
 2400 Hz: Must operate 2400 Hz ± 30 Hz
 (Internal switch selects 2400 Hz) Must not operate 2400 Hz ± 100 Hz

Sensitivity (ref. 600 Ω)

SF Pulses: +8 to -26 dBm
 Steady Tone (On-Hook): +8 to -38 dBm

Termination Impedance (SF = 2600 Hz)

Line or Drop: 600 Ω balanced
 Monitor: > 50 k Ω (< -0.1 dB loss)

Maximum Allowable 3KHz Noise At Input:

-40 dB or more below the TLP to maintain accuracy specifications

Balance:

Balanced input > 50 dB at 2600 Hz

DC Blocking:

Minimum 150 Vdc

Return Loss:

> 21 dB (200 to 3500 Hz)

Receiving Indicator:

LED lamp lighted when greater than minimum receiver level present at RCV jack

POWER INPUT:

Power supplied by the 1260A mainframe

SECTION 3

INSTALLATION

3.1 This section provides information needed to install the Model 1260A Pulsing Test Set.

3.2 INITIAL INSPECTION

3.3 The Model 1260A was carefully inspected, both mechanically and electrically, before shipment. It should be free of defects and should be operating correctly when received. To confirm this, the set should be visually inspected for signs of damage that may have occurred during shipment. If there is shipment damage, notify the carrier immediately. Electrical operation can be quickly checked by following the self check procedure contained in Section 4.

3.4 SERVICE INFORMATION

3.5 Complete warranty information is contained in the purchase order agreement under terms and conditions of sale. Summarized briefly, the Northeast Electronics warranty extends for a period of one year to the original purchaser of a Northeast test instrument. Northeast's system products are covered by a special warranty which can be summarized as follows.

☐ Hardware items are warranted for a period of 90 days.

☐ Software is warranted for a period of one year.

3.6 It is recommended that Northeast's Repair Department be contacted for assistance if, for any reason, a Northeast product fails to perform as expected. This step eliminates the needless delay entailed when a product is returned unnecessarily. Contact the Repair Department at Northern Telecom Inc., Northeast Electronics Division, P.O. Box 649, Concord, New Hampshire 03301, telephone: (603) 224-6511.

3.7 If a Northeast Electronics product requires factory servicing **during** the warranty period, be sure to include a ship-to-address and a description of the problem when returning the product to Northeast Electronics. **After** the warranty period has expired, equipment returned must be accompanied by all of the following.

☐ The number of the purchase order covering the cost of servicing,

☐ Bill-to-address,

☐ Ship-to-address,

☐ Description of problem.

3.8 In all cases, equipment requiring factory servicing should be sent to the Repair Department at the preceding address and telephone number. A return material authorization (RMA) number is **not** required, but will be provided by the Repair Department upon request.

3.9 MOUNTING PROCEDURE

3.10 The 1260A can be rack mounted or used as a portable unit. As a portable unit the set requires no installation. The 1260A comes supplied with brackets for mounting in 19-inch or 23-inch racks. Refer to Figure 3-1 and install the brackets as required to accommodate the rack being used.

3.11 POWER CONNECTIONS

3.12 The test set operates from 48 Vdc office battery. Power connections are made via a 310 jack located on the side of the set (portable use) or on the two-position terminal strip on the rear of the panel (rack-mounted use). Unit operates normally and will not be damaged if power is applied to more than one power input.

3.13 AC POWER OPTION

3.14 The AC power supply module installs quickly and easily:

1. Unscrew and remove the top panel on the 1260A.

2. Unfasten the four screws encircling the upper left-hand opening in the rear panel and remove the protective-plate covering.

3. Insert the AC power supply module so that the power receptacle, the 115/230 V slide switch, and the two fuses, face out through the opening.

4. Attach the two-pronged, polarized connector on the right side of the power module to the near-by matching connector on the 1260A.

5. Fasten the power supply in place with the four screws.

6. Replace and secure top panel.

7. Select desired setting on the 115/230V slide switch.

8. Connect an AC power cord to the power receptacle of the unit.

9. The 1260A can now operate directly from an ac line.

3.15 SF MODULE

3.16 The SF module requires minimal installation. Pull out the dummy board from either of the two front panel slots and insert and plug in the SF module.

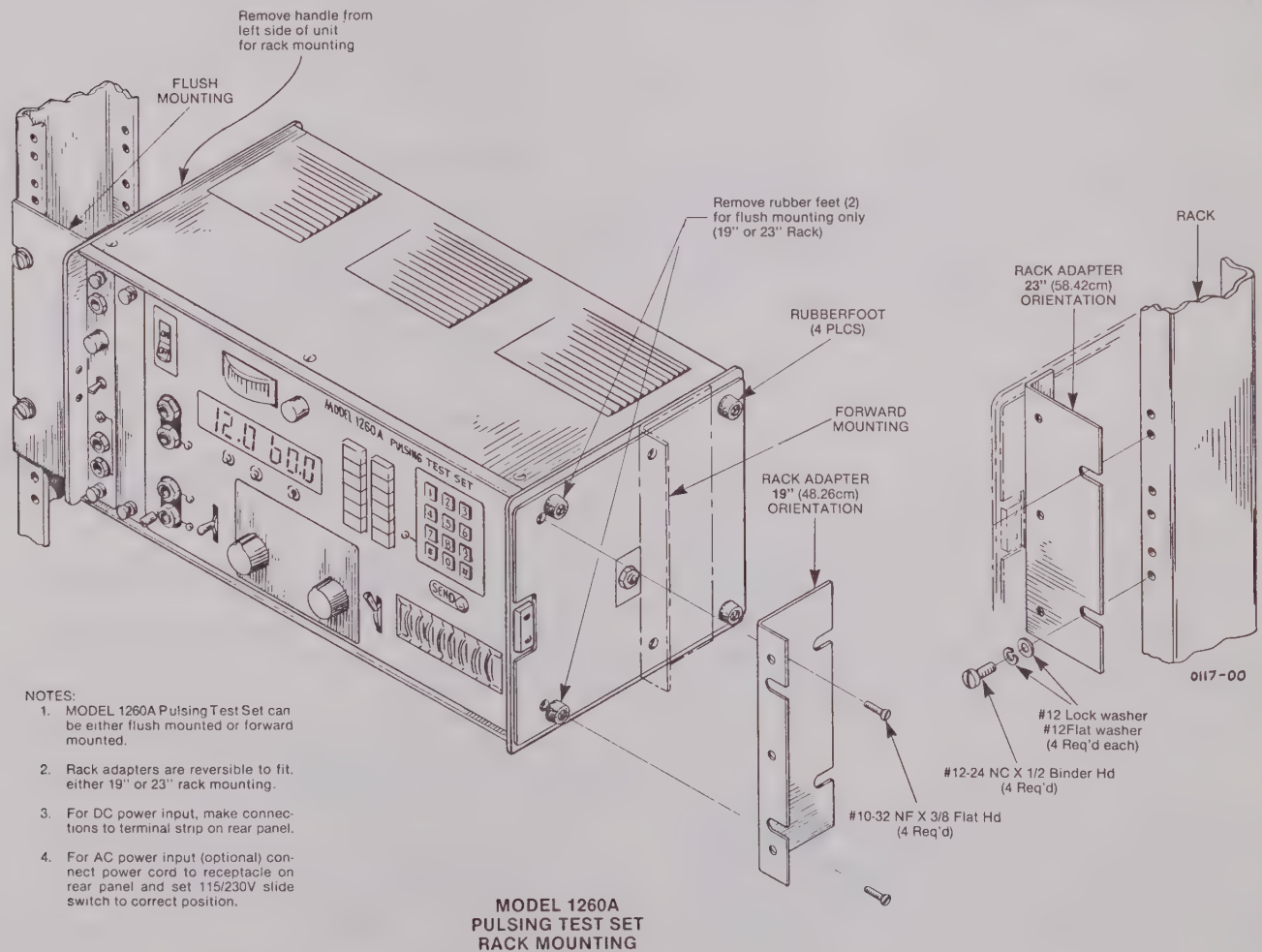


Figure 3-1. Model 1260A Pulsing Test Set Rack Mounting

SECTION 4

OPERATION

4.1 INTRODUCTION

4.2 This section provides: (1) descriptions of individual controls, indicators, and jacks; (2) general considerations that apply to many different operating procedures; (3) detailed operating procedures.

4.3 CONTROLS, INDICATORS, AND JACKS

4.4 Table 4-1 describes the operating controls on the 1260A as shown in Figure 4-1.

NOTE

The internally connected A-relay used in the Model 1260A does not make an appearance to the outside but is accessible for field adjustment. Although calibrated at the time of final test, it should be rechecked after shipment. For optimum results, recalibrate to user's specifications. Refer to paragraph 4.13 for details.

Table 4-1. Model 1260A Controls, Indicators and Jacks

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
POWER SECTION		
J6	-48V C.O. BATT jack (side panel)	310 jack for connection of central office battery when used as a portable unit. T = -48V, S = GND.
TB1	-48V C.O. BATT terminal strip (back panel)	Terminal strip for connection of central office battery when rack-mounted. TB1-1 = GND, TB1-2 = BATT. (TB1-3 and TB1-4 not used).
J5	GND jack	Provides a chassis ground for unit.
S1	POWER ON-OFF switch/indicator/circuit breaker	When set to ON position, -48V applied to unit and red indicator lighted. When circuit breaker tripped, switch set to OFF position. When placed at ON position, breaker resets.
SEND SECTION		
S20	SEND mode switch	Selects indicated conditions used for signaling and pulsing at either LOOP SEND, E&M LINE, or E&M DROP jacks.
S21	ON HOOK/OFF HK + DIAL/CONT switch	Controls send supervision, dialing, or pulsing by the 1260A. In ON HOOK position: applies a continuous on-hook signal to either LOOP SEND, E&M LINE, or E&M DROP jacks. Setting of SEND switch determines the actual signaling condition. In OFF HK + DIAL position: Applies an off-hook signal, determined by SEND switch, to either LOOP SEND, E&M LINE, or E&M DROP. When digit dialed on keypad, it outputs at speed, percent break and interdigital time set by the thumbwheel switches.

Table 4-1. (Cont'd)

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
		In CONT position: Applies continuous stream of pulses to either LOOP SEND, E&M LINE, or E&M DROP jacks. SEND switch determines make and break conditions while thumbwheel switches determine pulses per second, percent break, and interdigital time.
DS4	SEND monitor lamp	Follows send supervision and pulsing from the 1260A. Lamp lights when on-hook. Lamp is dark when off-hook. Lamp flashes when unit outputs.
S23,S24,S25	SEND PPS thumbwheels	Determine pulses per second for continuous and dial modes. Can be set within range of 1 to 29.9 pps. Setting cannot exceed 2 for most significant digit. No pulses generated for numbers less than 1.
S26,S27,S28	SEND % BREAK thumbwheels	Determine percent break for continuous and dial modes. Can be set within range of 10 to 89.9 percent break. Setting cannot have either 0 or 9 as most significant digit.
S29,S30	SEND ID X 10 MSEC thumbwheels	Determine interdigital time during continuous and dial modes. Can be set within range of 10 to 999 msec in 10 msec increments.
		NOTE
		ID times < 250 msec and averaged into pulse group. ID times > 999 msec are taken as a long ID time and a flashing "999" appears on display.
S17	Dial Keypad	Controls digits outputted when the ON-HOOK/OFF-HK + DIAL/CONT switch is set to the OFF-HK + DIAL position. Can send dial digits stored in memory or, in real time as the keys are pressed. The dial-from-memory feature stores and outputted a maximum of 16 digits. When entering the digits the memory ignores digits beyond the 16th digit. The excess digits are outputted in real time. Depressing the "*" key (designated STORE DIGITS) loads digits into memory. Unit leaves this entry mode when either: (1) a 10 second time interval between entries detected, (2) "#" key depressed which causes outputting to begin, (3) "*" key depressed again, or (4) more than 16 digits entered.

Table 4-1. (Cont'd)

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
DS5	STORE DIGITS monitor lamp	Depressing the "#" key (designated DIAL STORED DIGITS) output pulses stored digits. Output pulsing is aborted when either: (1) "#" key depressed a second time before output pulsing completed, (2) "*" key depressed (clears memory), or (3) the ON HOOK/OFF HK + DIAL/CONT switch is placed ON-HOOK. Depressing "#" after an abort (without memory cleared) causes output pulsing from memory to begin from the first digit again. Lamp flashes when "*" key depressed indicating memory in entry mode. Lamp remains lit when unit leaves entry mode indicating there is data stored in memory. Lamp goes out when either output pulsing completed or memory cleared.
S5 through S10	LOOP RES switches	Select value of balanced loop resistance placed in series with output when SEND switch positioned for either dry or wet loop. These push-pull type switches select binary-weighted resistance values from 100 to 6300Ω. Releasing all switches returns loop resistance to zero.
S11 through S16	LINE LEAK switches	Select either normal, A, B, C, D, D1 or SF1 line leak conditions (see Table 4-2). Mechanically-interlocked switches allow depressing of only one switch at a time.
RECEIVE SECTION		
S19	RECEIVE mode switch	Conditions receive section to accept signaling and pulsing as selected. Controls receive termination.
S3	MAX pushbutton	Depressing MAX pushbutton displays maximum speed and percent break measured since last reset.
S4	MIN pushbutton	Depressing MIN pushbutton displays minimum speed and percent break measured since last reset.
		NOTE Depressing both MAX and MIN pushbuttons simultaneously resets receive section and clears display. NOTE When using either MAX or MIN pushbuttons separately, the speed and percent break displayed did not necessarily occur during the same pulse period.



Table 4—1. (Cont'd)

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
S2	COUNT-ID-DIGITS pushbutton	When in the normal OFF condition, displays speed and percent break. Depressing COUNT-ID-DIGITS pushbutton displays total pulse count and minimum interdigital time measured since the last reset. Display remains frozen until pushbutton released. Depressing the pushbutton a second time (within 2 seconds of being released), displays the first digit dialed and the interdigital time measured immediately following the displayed digit. Releasing and then depressing pushbutton a third time, displays the second digit and subsequent interdigital time. Sequence continues through 16 dialed digits. Left-most LED identifies corresponding digit number (1—16). Numbers 10—16 identified by lighted decimal point in upper left-hand corner of LED display.
U1 through U6	PPS-PULSE COUNT-DIGIT and % BREAK-ID indicators	7-segment LED digital readouts that display speed and percent break when COUNT-ID-DIGITS pushbutton not depressed. When COUNT-ID-DIGITS pushbutton depressed, displays total pulse count, interdigital times and recalled dialed digits.
M1	Meter	Provides an "analog feel" indication of instantaneous percent break. The ends of the scale provide on-hook and off-hook indications showing the status of the circuit under test.
R2	METER ADJ potentiometer	Sets meter percent break indications to agree with digital readout.



Table 4—1. (Continued)

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
INPUT/OUTPUT JACKS, MONITOR INDICATORS AND CONFIGURATION CONTROL		
S18	E&M/LOOP switch	For the switch set at the top position (E&M SEND-RCV/ LOOP TERM): Allows resistive termination pulsing measurements on both E&M and loop. E&M leads are cut to allow sending toward line or drop. A low impedance of 400Ω terminates the loop circuit under test. The E&M test circuit is terminated by $4k\Omega$. For the switch set at the middle position (E&M MON+ THRU/LOOP BRDG (WET)): Allows bridged pulsing measurements on both E&M and wet loop. Provides for busy forward on all E&M tests and combination E&M send—loop receive tests. A high impedance of $20 k\Omega$ bridges the circuit under test for both E&M and wet loop. For the switch set at the bottom position (E&M SEND-RCV/ LOOP A-RELAY): The LOOP A-RELAY position allows simulation of "under load" termination for senders and repeaters. The A-relay coils connect internally with the LOOP RCV jack and contacts connect to the speed and percent break measuring circuits. NOTE The top and bottom E&M SEND-RCV positions are identical but due to LOOP settings required the following limitations should be noted: (1) Only the top position is valid for sending on E or M receiving through loops. (2) Only the bottom position is valid for sending on E or M and receiving through the A-relay.
J1	LOOP SEND 310 jack	LOOP SEND jack provides output for loop pulsing.
J2	LOOP RCV 310 jack	LOOP RCV jack provides input for loop pulsing. LOOP RCV jack provides an A-relay termination when the E&M/LOOP switch is thrown to the LOOP A-RELAY position.
J3	E&M LINE 310 jack	E&M LINE jack sends or receives looking toward the line (receives on E, sends on M).
J4	E&M DROP 310 jack	E&M DROP jack sends or receives looking toward the drop. (sends on E, receives on M).



Table 4—1. (Continued)

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
DS3	SLEEVE GND monitor lamp	Lights to indicate a busy (off-hook) condition. Remains dark to indicate an idle (on-hook) condition.
DS1	E monitor lamp	Flashes when receiving on the E lead. Lighted when circuit idle (on-hook). Dark when circuit busy (off-hook).
DS2	M monitor lamp	Flashes when receiving on the M lead. Lighted when circuit idle (on-hook). Dark when circuit busy (off-hook).
INTERNAL SWITCHES		
S22	E-SUPPRESSION CIRCUIT toggle switch	Switches in E-suppression circuit eliminating the need to unsolder network in pulsing tests. When switch (located right behind the front panel) thrown toward the front panel the suppression circuit is connected. To remove the suppression circuit from the network, throw the switch toward the rear panel. This is the normal, shipped, position.
A6S1	INPUT PULSE TIMER micro DIP switch	Switches in an input pulse timer network whose function is to safeguard measured results from false reading caused by transients. Position 1 switches in a 6.4 msec delay. Position 2 switches in a 12.8 msec delay. Position 3 switches in a 25.6 msec delay. Position 2 (12.8 msec) is position of switch when shipped.

4.5 Table 4—2 describes the operating controls of the ac power option for the Model 1260A as shown in Figure 4—1.

Table 4—2. AC Power Option (for Model 1260A) Controls and Jacks

REFERENCE DESIGNATOR	CONTROL OR JACK	FUNCTION
J1	AC jack (rear panel)	Power jack for connection to ac line.
S1	115/230V slide switch	Voltage switch selects either 115V or 230Vac.



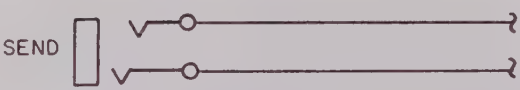
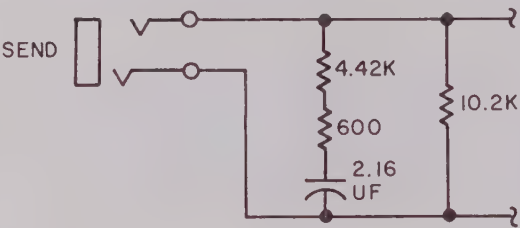
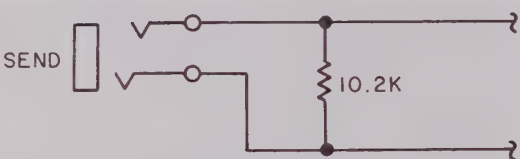
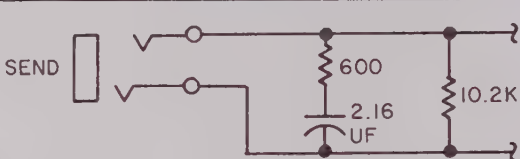
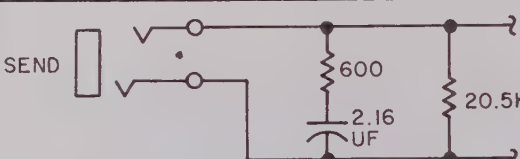
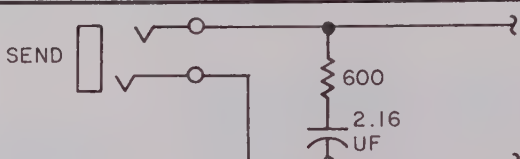
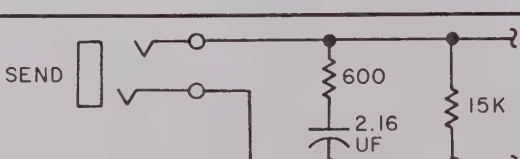
4.6 Table 4-3 describes the operating controls of the SF module option for the Model 1260A as shown in Figure 4-1.

Table 4-3. SF Module (for Model 1260A) Controls, Indicators, and Jacks

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
SEND SECTION		
S3	DEV FR SND TLP switch	Selects deviation above or below fixed send levels. Allows for +1 to +7 dB's above fixed level in 2 dB steps or -1 to -11 dB's below fixed level in 1 dB steps.
CONFIGURATION CONTROL		
S2	LINE/MON/DROP switch	For switch set at middle position (MON): Provides a through connection from the SF RCV jack to the SF SEND jack. A high impedance of 50 k Ω bridges the circuit for tone monitoring. For switch set at either top or bottom positions (SEND-RCV LINE or SEND-RCV DROP): Receiver terminated at 600 Ω . Line send level always 23 dB higher than drop send level (see table in Figure 4-22).
INPUT/OUTPUT JACKS AND MONITOR INDICATOR		
J1	EXT OSC 310 jack	Provides for connection to an external oscillator if needed.
J2	SF SEND 310 jack	Provides SF tone output for circuit under test.
J3	SF RCV 310 jack	Provides input for SF tone.
DS1	CKT IDLE monitor lamp	Stays lit to indicate ON HOOK (idle) condition. Flashes to indicate SF dialing being received. Remains dark when OFF HOOK (busy).
INTERNAL SWITCH		
S1	DIP multiple switch	S1-1 and S1-2: When switches closed, (normal position), provides SF signal of 2600 Hz. When switches open provides SF signal of 2400 Hz. S1-3 and S1-4: When switches open, (normal position) provides SF augmentation delay. When switches closed, defeats SF augmentation delay. S1-6 and S1-7: When switches open (normal position), provides 2600 Hz $\pm$ 30 Hz bandpass filter. When switches closed, provides a 1.5 kHz to 4 kHz band-pass filter.

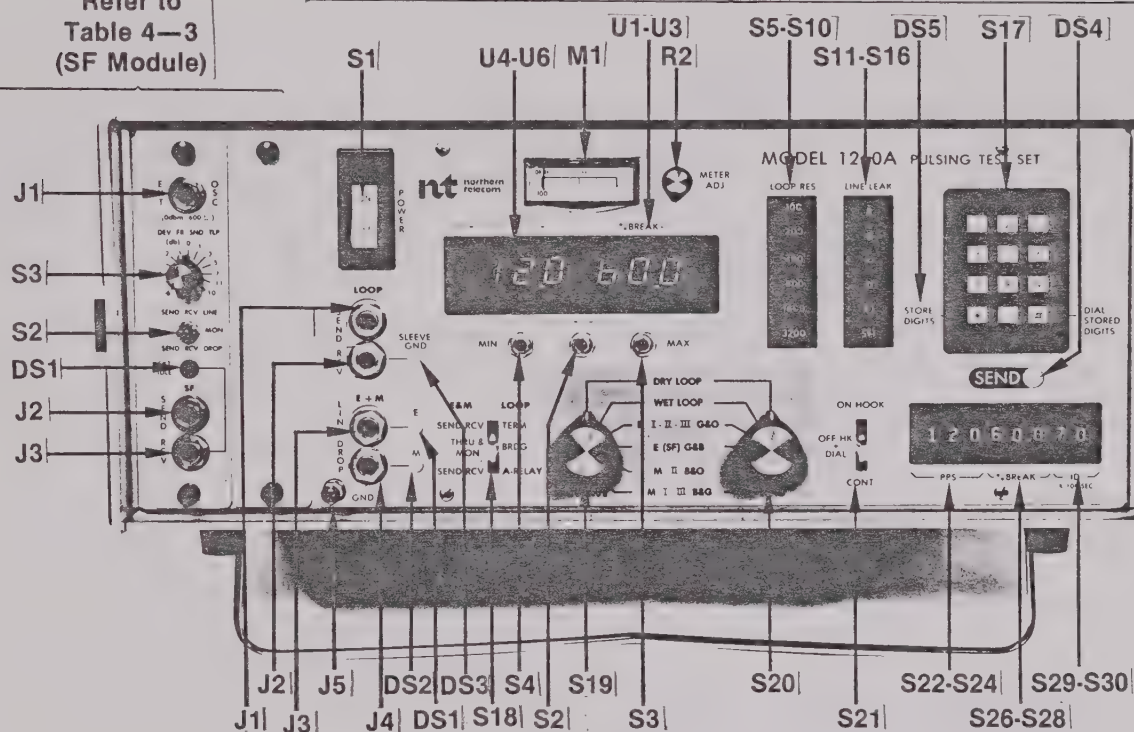


Table 4-4. Line Leak Networks

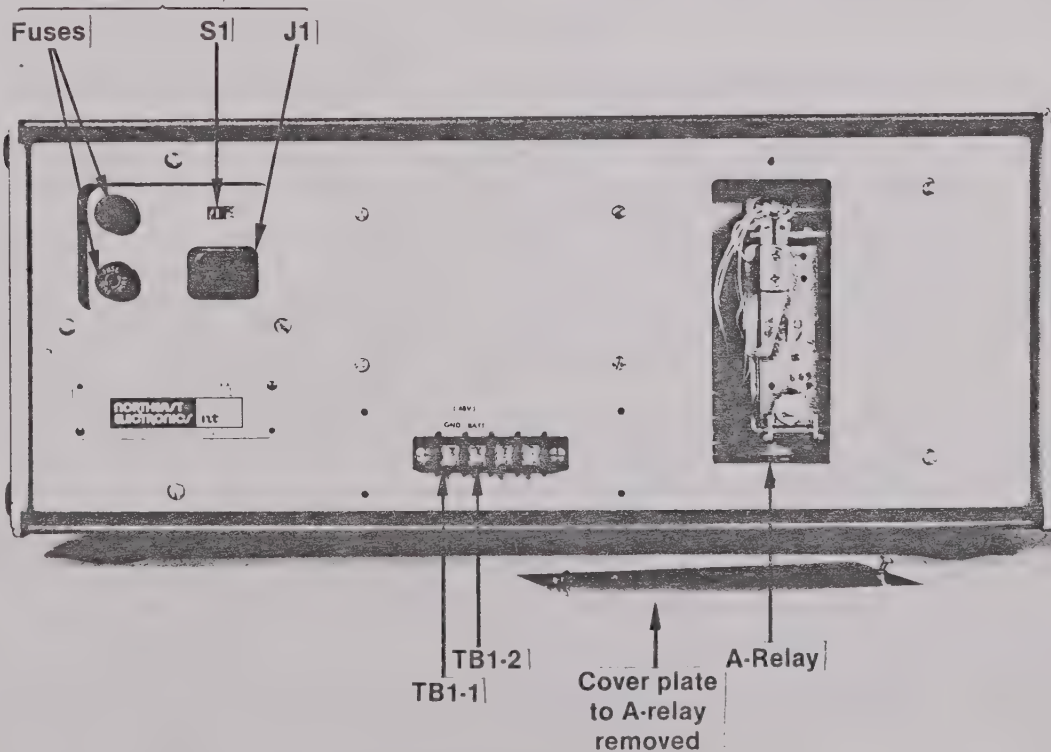
LEAK	SCHEMATIC	SIMULATES
NONE		Open circuit.
A		A subscriber line near the central office equipped with 5 C4A ringing bridge extensions and a 15 k Ω leak on the drop wire.
B		A sender output without contact protection and with a 10.2 k Ω leak.
C		A circuit sender loop pulsing network with a 10.2 k Ω leak across the trunk.
D		A sender output with a leak of 20.5 k Ω .
D1		Normally used with dial pulse sender circuits for loop pulsing to improve the percent break at the distant selector or connector "A" relay contacts.
SF1		A sender output with a 15 k Ω leak.

Refer to Table 4—1 (1260A Mainframe)

Refer to
Table 4—3
(SF Module)



Refer to
Table 4—2.



Refer to Table 4—1.

Figure 4—1. Model 1260A Controls, Indicators, And Jacks

4.7 GENERAL MAINFRAME OPERATING CONSIDERATIONS

4.8 Paragraphs 4.9 through 4.40 contain a set of general operating considerations that are referenced throughout the more detailed operating procedures contained in paragraphs 4.41 through 4.63.

4.9 POWER CONSIDERATIONS

4.10 The Model 1260A operates from a central office supply with a range of -42 to -57 Vdc with a maximum load current of 1 ampere.

4.11 To connect power, proceed as follows.

1. For portable units, connect the central office battery and ground to the CO BATT jack on the 1260A's side panel.

2. For rack-mounted units, connect the central office battery and ground to the BATT and GND terminals of the rear panel's terminal strip.

NOTE

The length of the power connections must not exceed 10 feet.

3. Ground the chassis by inserting one end of a cord into the GND jack on the bottom-left of the 1260A's front panel and the other end to central office ground.

4. Set the 1260A POWER switch to ON. The red indicator in the center of the switch should light.

4.12 If the 1260A contains the optional AC power supply module, refer to paragraph 3.11 for installation procedures. If already installed, select desired setting on the 115/230V slide switch on rear panel of the 1260A. Check and change fuses as needed. Connect an AC power cord to the receptacle on the rear panel of the 1260A. The unit can now be connected into and run from an ac power line.

4.13 A-RELAY CONSIDERATIONS

4.14 The internally-connected A-relay used in the 1260A does not make an appearance to the outside but is accessible for field adjustment.

1. Remove the small cover plate on the right side of the rear panel.

2. The A-relay is now accessible. Calibrate as per Table 4-5.

Table 4-5. A-Relay Calibration Specifications

PARAMETERS	SPECIFICATIONS
Break Gap	0.006 in.
Make Gap	0.004 in.
Residual	0.009 in.
Readjust Operate Current	16.5 mA
Readjust Non-Operate Current	14.4 mA
Dynamic Test	$60 \pm 2\%$ break*

*When pulsed at 60% break and 12 pps use line leak A, 49 ± 0.2 Vdc power supply and $1.2 \text{ k}\Omega$ of loop resistance. Adjust spring tension until acceptable results are obtained. See Figure 4-2.

3. Replace the cover plate on the rear panel.

4.15 CONSIDERATIONS WHEN SENDING AND RECEIVING DIAL PULSES

4.16 When measuring pulsing speed and percent break of dialed digits, the various digital readout indications depend upon certain conditions. These conditions include the actual digit dialed and the interdigital time.

4.17 The 1260A continually updates and displays the average speed and percent break for every digit dialed greater than 1.

4.18 The MIN and MAX pushbuttons display the minimum and maximum speed and percent break values received for digits 2 through 9 and 0. The readouts update for each pulse measured providing the speed and percent break is (1) greater than the previous maximum or (2) less than the previous minimum since the last reset. To clear and reset the display, depress the MAX and MIN pushbuttons simultaneously. Refer to Table 4-6 for illustrations on the use of the MAX and MIN pushbuttons.

4.19 The COUNT-ID-DIGITS pushbutton displays the number of pulses received, the minimum interdigital (ID) time received, and the dialed digits with ID time directly following the received digit. The readouts update for the pulse count and the minimum ID time. The COUNT-ID-DIGITS pushbutton also provides, on command, the measured and stored ID times following the first 16 digits received as well as the digits themselves. To clear and reset the display, depress the MAX and MIN pushbuttons simultaneously. Refer to Table 4-6 for illustrations.

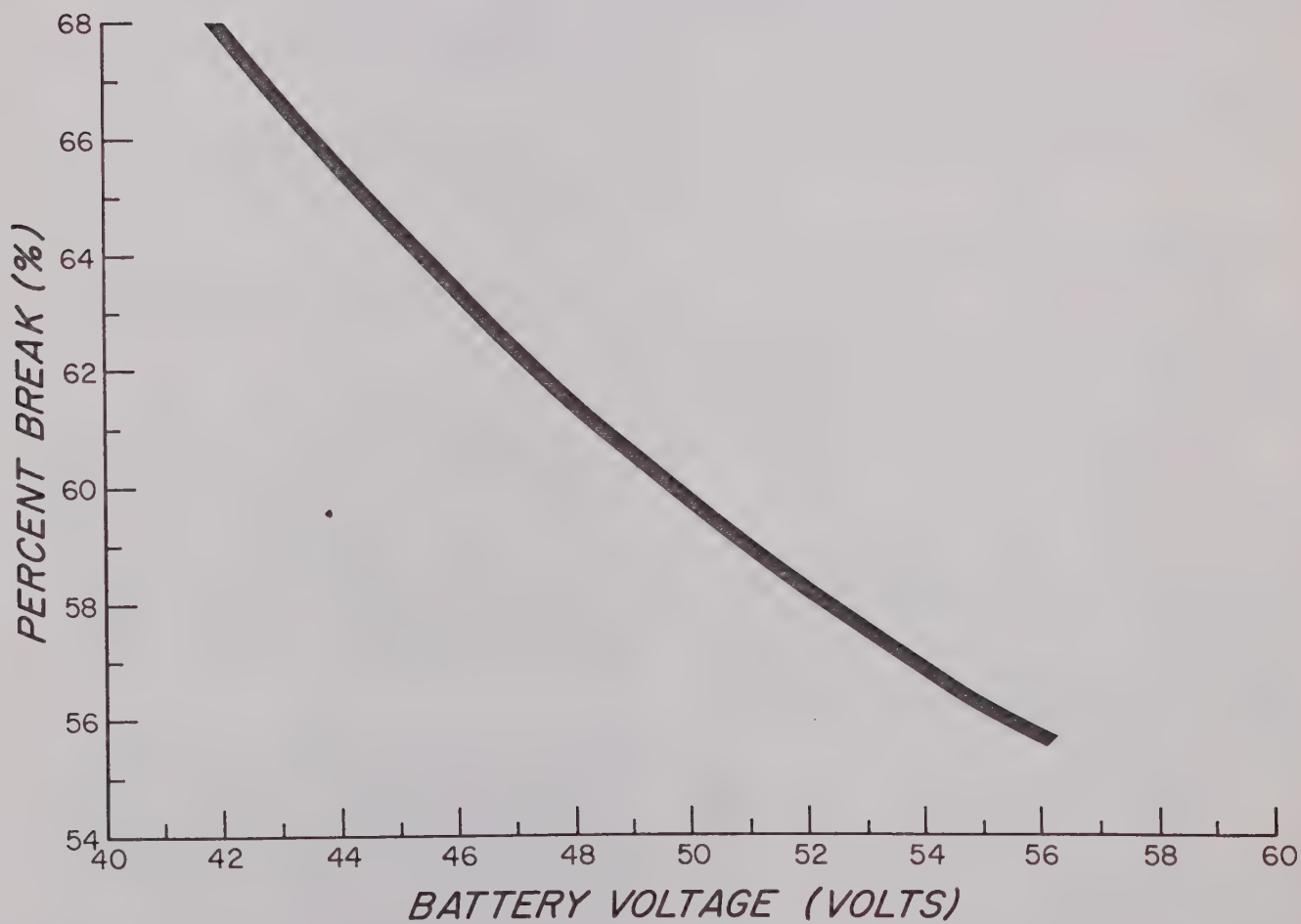


Figure 4-2. "Percent Break Versus Battery Voltage For A-Relay"

Table 4—6. Receiving Continuous And Dial Pulsing

NOTE

To make the descriptions in Table 4—6 easier to follow, the six LED's that comprise the digital display are referenced by their position from left to right (1 through 6) respectively.

1. Normal condition (no pushbuttons depressed)

1	2.	0	6	0.	1
PPS			% BREAK		

Positions 1—3: Display the average number of pulses per second received. For continuous pulsing, the display updates the average speed every 10 pulses. For dialed digits, the display updates the average speed for each digit greater than one.

Positions 4—6: Display the average percent break received. For continuous pulsing, the display updates the average percent break every 10 pulses. For dialed digits, the display updates the average percent break for each digit greater than one.

2. MAX pushbutton depressed and held.

1	2.	8	6	3.	5
PPS			% BREAK		

Positions 1—3: Display the maximum number of pulses per second since the last reset.

Positions 4—6: Display the maximum percent break since the last reset.

NOTE

When using this pushbutton, although speed and percent break are displayed at the same time, it does not necessarily indicate that both occurred during the same pulse period.

3. MIN pushbutton depressed and held.

1	0.	7	4	8.	5
PPS			% BREAK		

Positions 1—3: Display the minimum number of pulses per second since the last reset.

Positions 4—6: Display the minimum percent break since the last reset.

NOTE

When using this pushbutton, although speed and percent break are displayed at the same time, it does not necessarily indicate that both occurred during the same pulse period.

4. COUNT-ID-DIGITS pushbutton depressed and held.

1	3	7	6	5	3
COUNT			ID		

Positions 1—3: Display the number of pulses received since the last reset.

Positions 4—6: Display the minimum ID time since the last reset.

NOTE

Depressing the pushbutton again, after **more** than two seconds have elapsed since its release, displays the latest pulse count and minimum ID time updates.

5. COUNT-ID-DIGITS pushbutton released and, **within 2 seconds**, depressed and held again.

1		5	7	0	3
DIGIT			ID		

Position 3: Displays the digit received.

Position 1: Displays the location in the string of pulsed digits for the particular dialed digit displayed. Digits and locations 2, 3, etc. up to 16 are displayed in sequence by releasing the COUNT-ID-DIGIT pushbutton for less than 2 seconds between digit displays then depressing it again to display the next digit in sequence. Digit locations of 10 through 16 are denoted by a dot in the upper left corner of the digit location display.

Positions 4—6: Display the ID time following each received digit up to 16.

6. Special display indicators.

2		5	9	9	9
DIGIT			ID		

Table 4-6. (Cont'd)

(a) Positions 4-6 flash "999" when an ID time exceeds 999 msec. Note that the location number position 1) is 12, not 2, due to the dot in the upper left corner of the display.

9	9	9	7	0	1
COUNT			ID		

(b) Positions 1-3 flash "999" when the pulse count exceeds 999.

4		c	7	0	1
DIGITS			ID		

(c) Position 3 displays a "C", for continuous, when more than 10 pulses are received for any digit. Positions 4-6 display the ID time immediately following the over-long digit.

c	c	c	c	c	c
PPS			% BREAK		

(d) All positions will display a "c" when the send PPS/ID thumbwheels are set to an illegal position. Refer to both the specifications and Figure 4-1 for proper ranges.

NOTE

If any position displays a **flashing "c"** this indicates that the data did not register properly.

4.20 The 1260A must have an ID time greater than 250 msec but less than one second for proper measurements to occur. An ID time greater than 999 msec causes the display to flash "999". Any two pulse strings separated by less than 250 msec of ID time are interpreted and stored as a single digit and the ID time stored and displayed is the time following the second digit. If more than 10 pulses are received for a dialed digit a "c" for continuous will be stored and displayed for that digit. Refer to Table 4-6 for illustrations of these situations.

4.21 Table 4-6 illustrates various types of readouts encountered with the use of the 1260A.

4.22 PURPOSE AND OPERATION OF THE KEYPAD DIAL-FROM-MEMORY FEATURE

4.23 The keypad dial-from-memory feature provides the capability to automatically dial up to 16 digits from memory.

4.24 To load digits, depress the "*" character on the keypad designated "STORE DIGITS". A lamp just above the "STORE DIGITS" starts flashing indicating that the succeeding digit pressed will go into memory. Digits must be entered within 10 seconds of each other to maintain the unit in this memory-entry mode.

4.25 When the lamp stops flashing and remains lit, the unit has left the memory-entry mode and the digits are stored in memory. This can occur if any one of the following four things occur.

1. The unit detects a 10 second time lapse since the last digit was entered.
2. The "*" key is depressed a second time.
3. 16 digits are entered. Any digits entered after the first 16 digits will not be stored but will be outpulsed in real time.
4. The "#" key is depressed, causing the stored digits to be outpulsed from memory.

4.26 To dial from memory, the ON HOOK/OFF HK + DIAL/CONT switch must be set to OFF HK + DIAL. Then, depress the "#" character on the keypad, causing outpulsing of the stored digits to begin. This process can be aborted in any one of these ways.

1. Set the ON HOOK/OFF HK + DIAL/CONT switch to the ON HOOK position.
2. Depress the "#" key again before outpulsing is completed.
3. Depress the "*" key during outpulsing. This last method also clears the keypad memory.

NOTE

Depressing the "#" key after an abort causes outpulsing to start over again from the beginning of the digit string.

4.27 Clearing the keypad memory does **not** clear the digital display memory. Only depressing both the MAX and MIN pushbuttons simultaneously will clear the display's memory.

4.28 CONSIDERATIONS WHEN DIAGNOSING INDIVIDUAL PULSE PROBLEMS

4.29 A particularly useful application of the min/max function is that of detecting first pulse problems in relays and other relay-type equipment such as switch trains. When this type of problem exists, the percent break of



the first pulse in a dialed digit may be decreased to the point where the call is completed to the wrong number or maybe not be completed at all. The same type of problem can also occur regularly during some pulse other than the first pulse. In either case, the Model 1260A can be used to pinpoint the problem to a given pulse in a digit, provided the problem occurs on a regular enough basis to allow solid confirmation. This is possible because the Model 1260A can display the minimum percent break measured in any digit from 2 through 9 and 0.

4.30 To confirm a suspected first pulse problem, clear the 1260A's display and pulse the circuit under test with the digit 0. After a digital display appears, depress the MIN pushbutton. If a first pulse fault did occur, the minimum percent break will be considerably less than the percent break selected on the pulsing test set. Next clear the display again and pulse the circuit with the digit 2. Again depress the MIN pushbutton. If the minimum percent break is again very low, it is confirmation that the percent break of the first or second pulse is being distorted. If the minimum percent break displayed is normal, this indicates that the percent break is being distorted during a pulse other than the first or second pulse. The pulse at fault can be detected using the technique outlined in paragraph 4.31. The tests just described should be repeated a number of times to determine if the problem is chronic or intermittent.

4.31 When the minimum percent break from a measured 0 is very low but is not a first or second pulse problem, the pulse in error can be located by sequentially measuring and displaying the digits 3 through 9 and 0 until the minimum percent break is found to be very low at a particular digit. The pulse having the distorted percent break is then known to be the same as the digit that produced the abnormally low minimum percent break. For example, assuming the digit 0 produces a low minimum percent break; the digit 4 is normal, and the digit 5 is a low minimum percent break; it can then be deduced that the fifth pulse has a distorted percent break. Between digits, reset the display by depressing the MAX and MIN pushbuttons simultaneously. This procedure should be repeated a number of times to determine whether the problem is chronic or intermittent.

4.32 E-LEAD SUPPRESSION REQUIREMENTS

4.33 When switched in, a contact suppression circuit of $0.15\mu\text{F}$ and 300Ω connects between the E-lead (tip of the E&M DROP JACK) and ground. This occurs when: (a) the E&M/LOOP switch is set to the E&M SEND-RCV position, (b) the SEND switch is set to either E position, and (c) the internal E SUPPRESSION CIRCUIT toggle switch is thrown toward the front panel.

4.34 The 1260A comes shipped with the contact suppression circuit switched **out**. To switch the circuit in or back out again perform the following steps.

1. Remove the three screws securing the 1260A's top panel.
2. Lift the top panel out of the way.
3. Locate the E SUPPRESSION CIRCUIT toggle switch. It is slightly behind the front panel in a vertical plane with the METER ADJ knob.
4. To switch in the contact suppression circuit, throw the toggle switch toward the front panel.
5. To remove the contact suppression circuit, throw the toggle switch toward the rear panel.
6. Secure the top panel back into place.

4.35 LOOP RESISTANCE AND LINE LEAK CONDITIONS

4.36 The loop resistance and line leak conditions are used in the send mode for dry loop or wet loop pulsing only. Resistance values of zero to $6.3\text{k}\Omega$ can be selected in 100Ω increments. This is used to simulate the line resistance offered to pulsing circuits.

4.37 Standard leak conditions of normal, A, B, C, D, D1, and SF1 can be selected. Refer to Table 4-4 for the schematic diagrams of the leak circuits provided in the 1260A.

4.38 MEASUREABLE COMBINATIONS OF PULSING SPEED AND PERCENT BREAK

4.39 The 1260A can only measure certain combinations of pulsing speed and percent break. An input pulse timer internal switch plays a major role in determining the operating area available. This switch provides three separate time settings: 6.4 msec., 12.8 msec., and 25.6 msec. Figure 4-3 shows a graphical representation of the interrelationship of switch settings and the pulsing speed and percent break parameters. Any combination of pulse speed and percent break that falls outside of an enclosed area, as selected by the input pulse timer switch, will not generate a display of acceptable accuracy.

4.40 The 1260A comes shipped in the 12.8 msec. setting (solid lines on graph). To change the input pulse timer internal switch setting proceed as follows:

1. Remove the top panel from the 1260A.

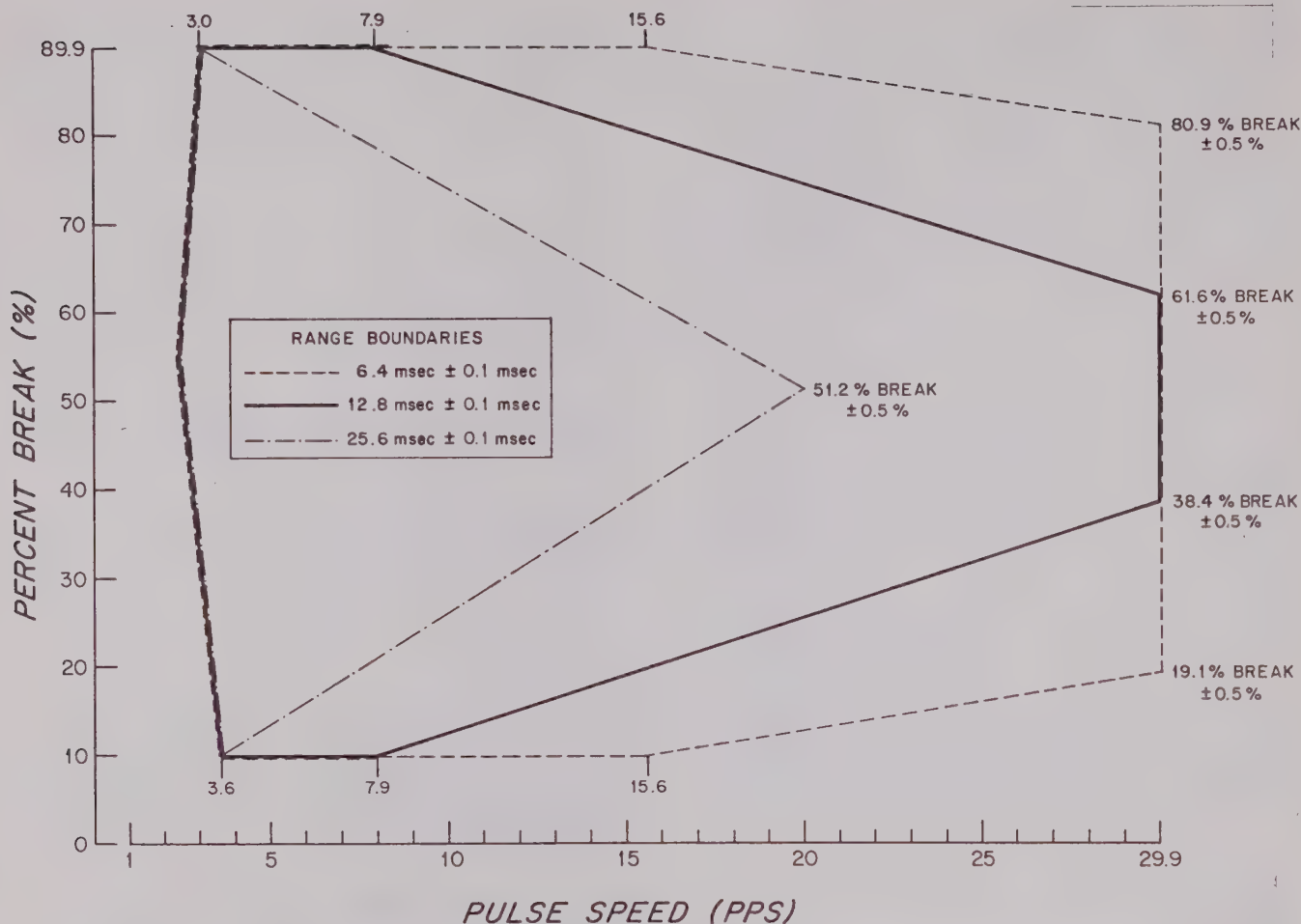


Figure 4-3. Receive Maximum And Minimum Percent Break Versus Pulse Speed

2. Locate the micro DIP switch. It mounts on the upper right corner of the analog receiver board (middle panel) facing out toward the front panel.

3. Using a screwdriver, turn the switch to the desired setting.

4. Replace the top panel.

4.41 MAINFRAME OPERATING PROCEDURES

4.42 Paragraphs 4.45 through 4.63 provide operating procedures for using the Model 1260A in all of its send only, receive only, send and receive simultaneously, and mixed-mode operations such as sending loop and receiving E&M. Paragraph 4.43 is a self-check that can be performed at any time to verify that the unit is operating properly.

NOTE

For the procedures that follow, it is assumed that the proper power connections have been made. Refer to paragraph 4.9 for a discussion of power considerations and procedures.

4.43 MAINFRAME SELF CHECK

4.44 To check out the send and receive sections, perform the following steps.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.

2. Set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK.

3. Using a cord equipped with 310 plugs, insert one plug into the LOOP SEND jack and the other into the LOOP RCV jack.

4. Set the E&M/LOOP switch to LOOP TERM.

5. Turn the RECEIVE and SEND dials to DRY LOOP.

6. Release all LOOP RES and LINE LEAK switches.

7. Set the PPS/% BREAK/ID X 10 MSEC thumb-wheel switches to some convenient combination such

as 12 pps at 60 percent break and 700 msec. See paragraph 4.38 and Figure 4-3 for allowable combinations of pulse speed and percent break. See paragraph 4.20 for ID time considerations.

8. Set the ON HOOK/OFF HK + DIAL/CONT switch to CONT.

9. Depress the MAX and MIN pushbuttons simultaneously to clear the display. The speed and percent break set on the thumbwheel switches should now appear on the digital display. Acceptable accuracy is ± 0.1 pps and $\pm 0.5\%$ break.

10. Depress and hold the MAX pushbutton. The display should agree with the values set on the thumbwheels for both speed and percent break. Acceptable accuracy is ± 0.1 pps and $\pm 0.5\%$ break.

11. Depress and hold the MIN pushbutton. The display should agree with the values set on the thumbwheels for both speed and percent break. Acceptable accuracy is ± 0.1 pps and $\pm 0.5\%$ break.

12. Set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL.

13. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

14. On the keypad, depress any number key other than "1". The display should agree with the values set on the thumbwheels for both speed and percent break. Acceptable accuracy is ± 0.1 pps and $\pm 0.5\%$ break.

15. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

16. Load digits into the keypad memory by depressing the "*" key first. The STORE DIGITS lamp should start flashing, indicating that the keypad is in the loading mode. Refer to paragraph 4.22 for a fuller explanation of the keypad dial-from-memory feature.

17. Depress keys 1 through 0 in order.

18. Exit loading mode by depressing "*" again. The STORE DIGITS lamp should remain lit.

19. Outpulse stored digits by depressing the "#" key. The speed and percent break should update for every digit greater than one.

20. Depress the MAX and the MIN pushbuttons one at a time. The display will indicate the maximum or minimum speed and percent break respectively that has been measured since the last time both pushbuttons were depressed simultaneously. The speed and percent break displayed did not necessarily occur during the same pulse. Acceptable accuracy is ± 0.1 pps and $\pm 0.5\%$ break.

21. Depress and hold the COUNT-ID-DIGITS pushbutton. The left side of the display will show the updated pulse count. The right side of the display will show the minimum ID (interdigital) time received. Acceptable accuracy for the ID time is ± 2.0 msec.

22. Release and, within two seconds, depress and hold the COUNT-ID-DIGITS pushbutton again. The first digit entered on the keypad (in this case, "1") will appear left of center, with its position in the sequence, far left, (in this case, "1" again) on the display. (See Table 4-6 for an illustration of this type of display.) The right side of the display will show the ID time immediately following the displayed digit. Acceptable accuracy for the ID time is ± 2.0 msec.

23. Step through the rest of the digits entered by repeatedly releasing, then, within two seconds, depressing and holding, the COUNT-ID-DIGITS pushbutton. The ID times displayed should all be ± 2.0 msec of the value set on the thumbwheels. Since no other pulses follow it, the last digit entered will not have an ID time following it to display. A "999" will flash on the right side of the display instead. Refer to paragraph 4.20 and Table 4-6 for a further explanation.

4.45 SENDING DRY OR WET LOOP

4.46 To send only on a dry or wet loop (battery and ground) basis, perform the following steps. See Figures 4-4 and 4-5 for the illustrations showing the relationships between the LOOP SEND jack and the internal circuits that define the conditions appearing at the tip and ring.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.

2. Verify that the circuit under test is idle.

3. Set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK.

4. Insert a 310 plug into the LOOP SEND jack and connect the other end of the cord to the circuit to be pulsed.

5. Turn the SEND dial to either DRY LOOP or WET LOOP as required.

6. If required, depress the appropriate LOOP RES and LINE LEAK pushbuttons.

7. Set the PPS/% BREAK/ID X 10 MSEC thumbwheel switches as required. Refer to paragraph 4.38 and Figure 4-3 for pulse speed and percent break considerations. Refer to paragraph 4.20 for ID time considerations.

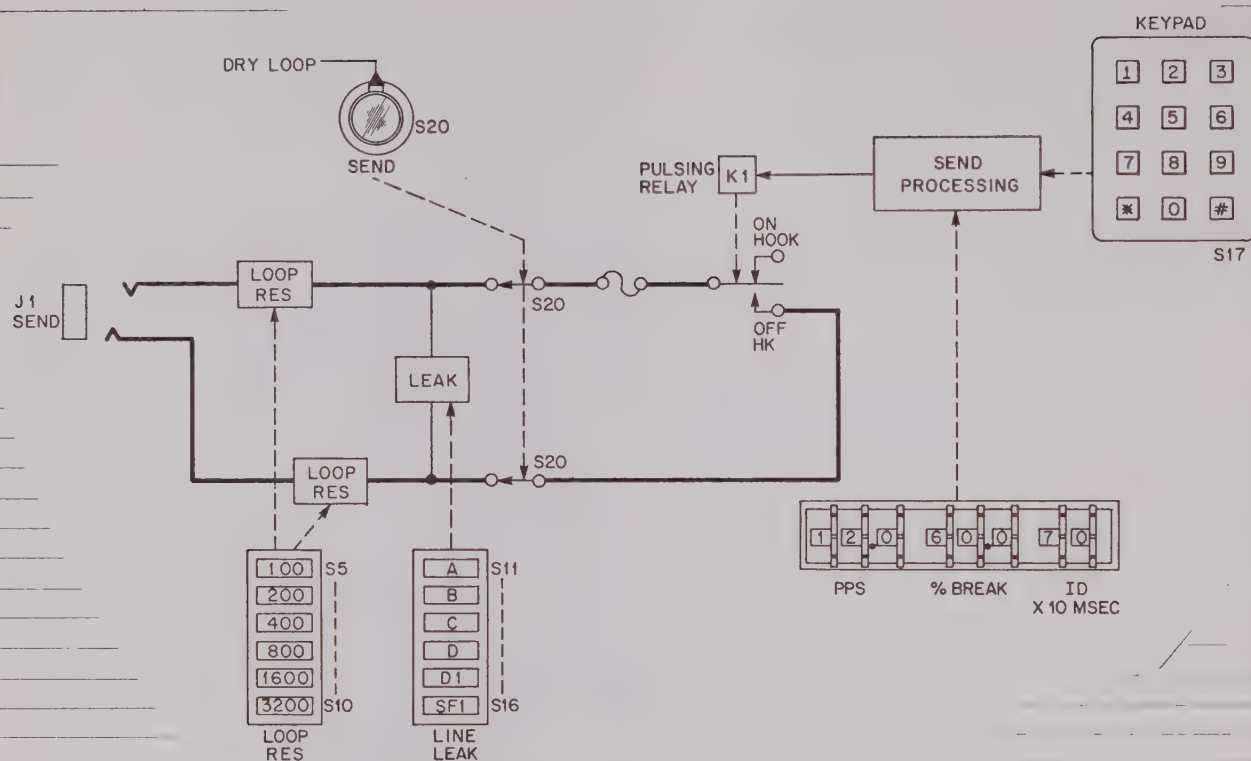


Figure 4—4. Sending Dry Loop

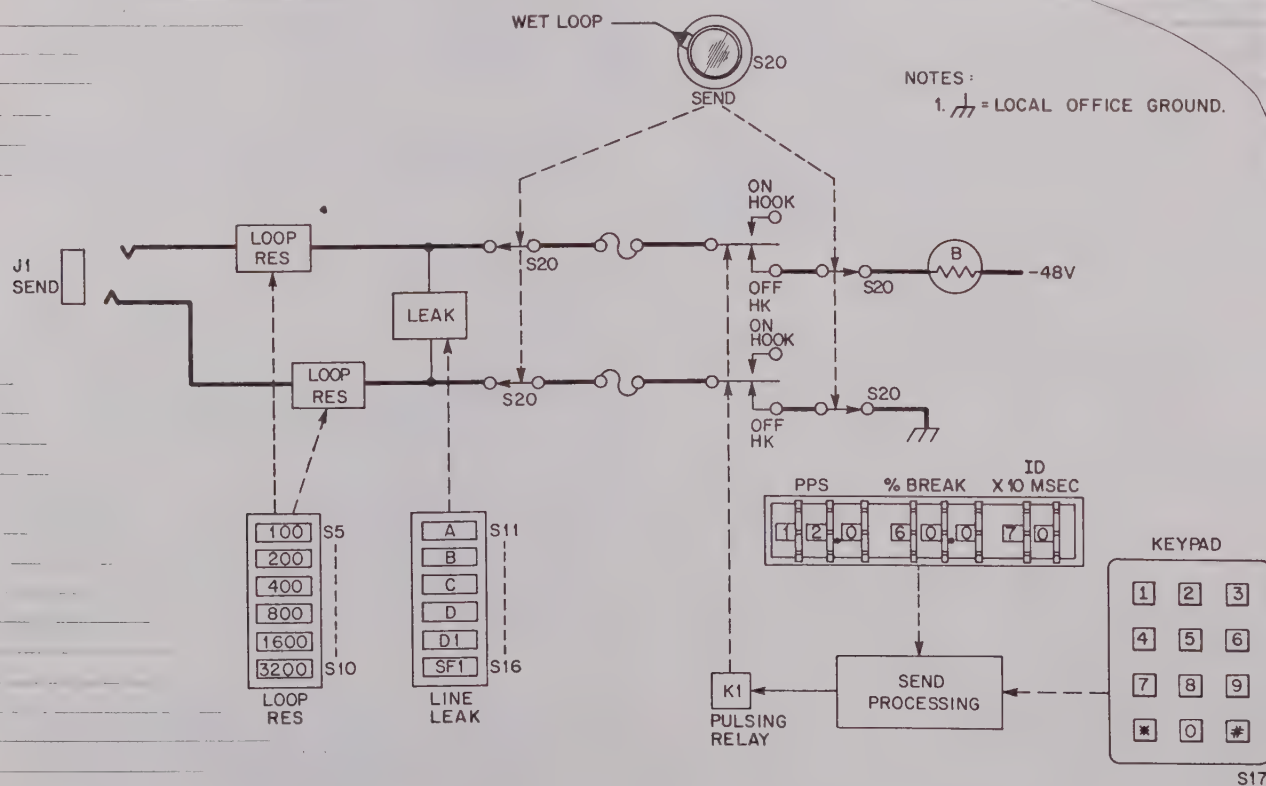


Figure 4—5. Sending Wet Loop (Battery And Ground)

8. For sending a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT.

9. For outputting dialed digits using the keypad, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. If outputting in real time, refer to paragraph 4.15 for considerations when sending and receiving dialed pulses. If outputting from memory, refer to paragraph 4.22 for an explanation of the keypad dial-from-memory feature as well as paragraph 4.15 cited above.

4.47 SENDING E&M

4.48 To send only (either on the M lead toward the line or on the E lead toward the drop) perform the following steps. See Figure 4-6 for an illustration showing a typical interface between the 1260A and an E&M jackfield. Figures 4-7 and 4-8 illustrate the E&M LINE and E&M DROP jacks in relation to the internal circuits that define the conditions at the jacks that can be measured.

1. Turn the 1260A power control switch ON. The red lamp in the center of the switch should light.

2. Verify that the circuit under test is idle.

3. Set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK.

4. To send on the E lead towards the drop, insert a 310 plug into the E&M DROP jack and connect the other end of the cord to the E&M circuit to be pulsed.

5. To send on the M lead towards the line, insert a 310 plug into the E&M LINE jack and connect the other end of the cord to the E&M circuit to be pulsed.

NOTE

The 1260A provides an automatic busy-out in the reverse direction for E&M testing.

6. Set the E&M/LOOP switch to either E&M SEND-RCV position.

7. To send on the E lead toward the drop, turn the SEND dial to either EI-II-III B&G or E (SF) G&B.

8. To send on the M lead toward the line, turn the SEND dial to either M II B&O or MI-III B&G.

9. Set the PPS/% BREAK/ID X 10 MSEC thumb-wheel switches as required. Refer to paragraph 4.38 and Figure 4-3 for pulse speed and percent break conditions. Refer to paragraph 4.20 for ID time considerations.

10. For sending a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT.

11. For outputting dialed digits using the keypad, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. If outputting in real time, refer to paragraph 4.13 for considerations when sending and receiving dialed pulses. If outputting from memory, refer to paragraph 4.22 for an explanation of the keypad dial-from-memory feature as well as paragraph 4.15 cited above.

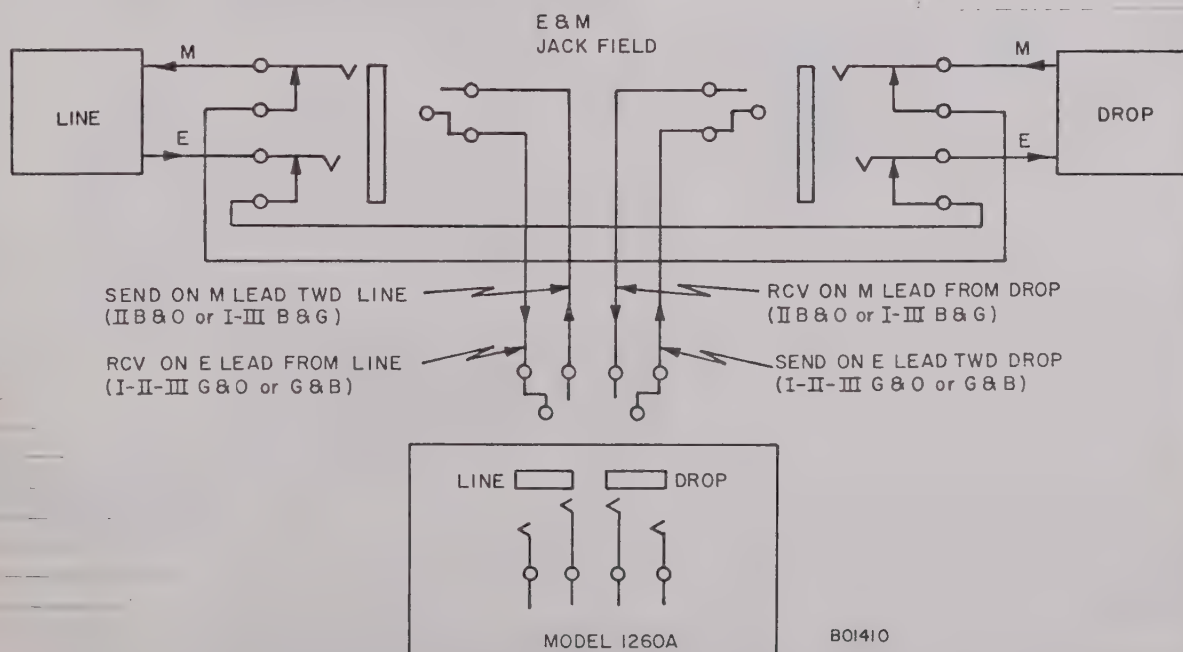


Figure 4-6. Typical Model 1260A Interface With E&M Circuits

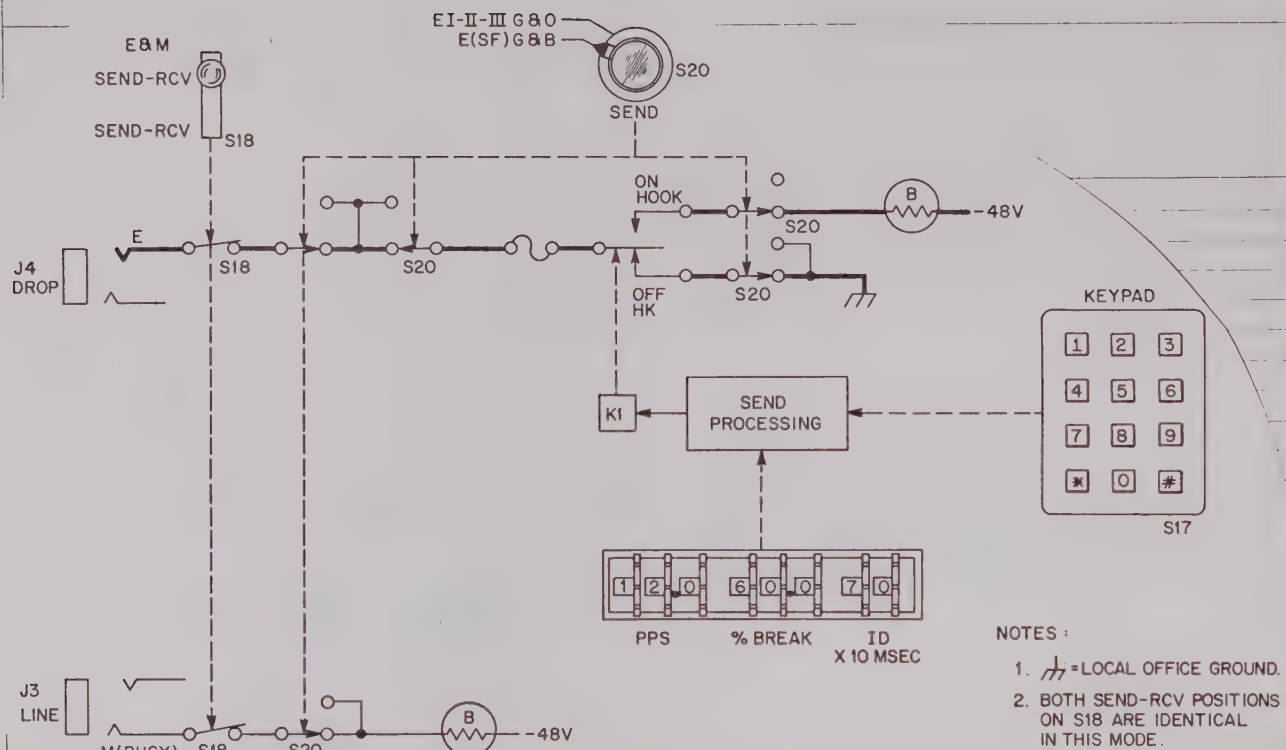


Figure 4-7. Sending On The E Lead Toward The Drop

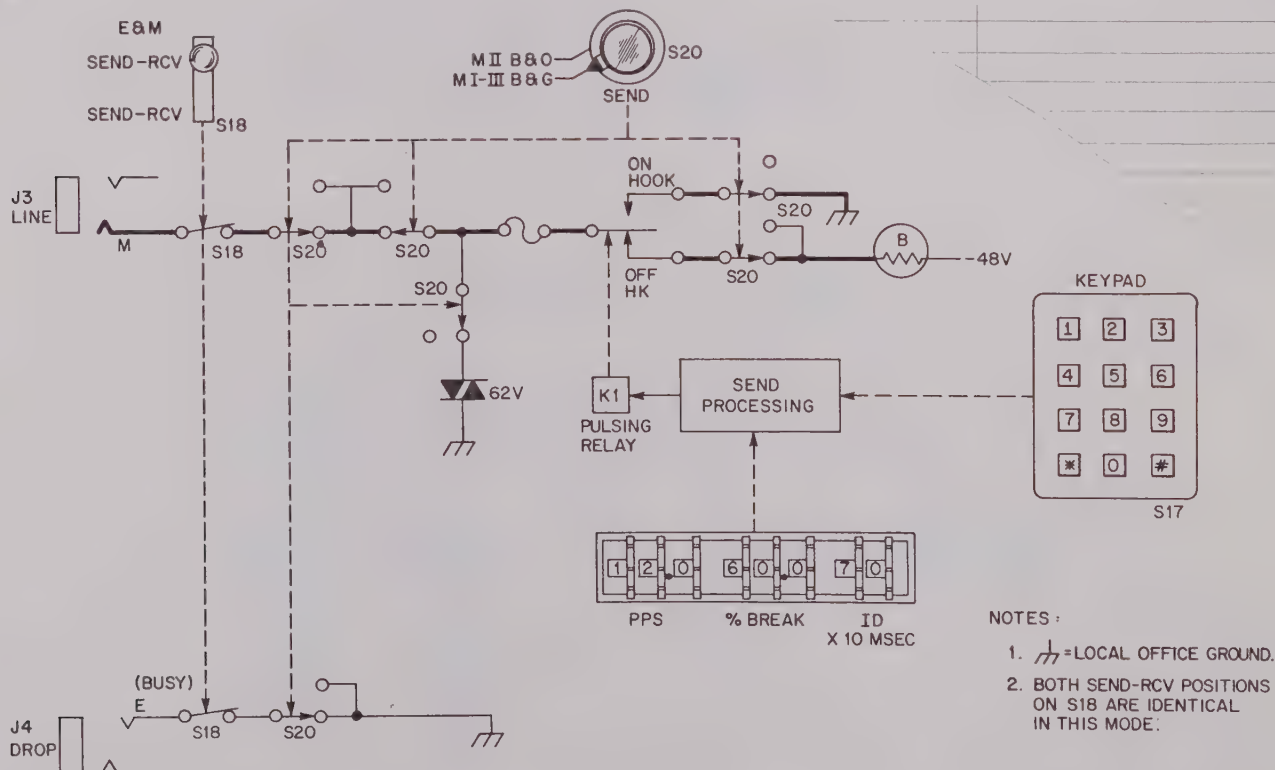


Figure 4-8. Sending On The M Lead Toward The Line

4.49 RECEIVING DRY OR WET LOOP

4.50 To receive only on a dry or wet loop (battery and ground) basis, perform the following steps. See Figures 4-9, 4-10, and 4-11 for the illustrations that show the LOOP RCV jack in relation to the internal circuits that define the conditions appearing at the tip and ring.

NOTE

There are certain combinations of pulsing speed and percent break that the 1260A cannot measure. Refer to paragraph 4.15 and Figure 4-3 for the information. Refer to paragraph 4.20 for detailed information on measurable ID times and considerations.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.

2. Verify that the circuit under test is idle.

3. Insert a 310 plug into the LOOP RCV jack and connect the other end of the cord to the set of pulsing contacts to be measured.

NOTE

If a set of pulsing contacts is **not** conveniently available, switch in the 1260A's internal A-relay by setting the E&M/LOOP switch to LOOP A-RELAY.

4. If a set of pulsing contacts **is** available, set the E&M/LOOP switch to LOOP TERM if a low impedance is required.

5. To terminate the circuit under test in a high impedance, set the E&M/LOOP switch to LOOP BRIDGE (WET).

NOTE

Do **not** bridge on dry loop. If a dry loop is bridged, the 1260A shows a continuous off-hook on its analog meter and does not respond to an input. The 1260A will also interfere with a call in this mode.

6. Turn the RECEIVE dial to DRY LOOP or WET LOOP as required.

7. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

8. If receiving a continuous stream of pulses, the digital display will show the average pulse speed and percent break after 10 pulses have been received and measured. The display will update automatically every 10 pulses thereafter.

9. When either the MAX or the MIN pushbutton is depressed separately, the display will indicate the maximum or minimum speed and percent break measured since the last time the display was cleared. When either pushbutton is depressed, both the speed and percent break are displayed together. This does not imply that they necessarily occurred during the same pulse.

10. If desired, use the METER ADJ control to set the meter indicator-line to agree with the digital display. The meter can be used to observe short-term perturbations in the received percent break. It also provides on-hook and off-hook indications.

11. If receiving and measuring dial-pulsed digits, refer to paragraph 4.15 for a discussion of considerations when sending and receiving dial pulses. Detailed explanation of the use of the CONT-ID-DIGITS pushbutton, as well as the MAX and MIN pushbuttons, are included in this discussion.

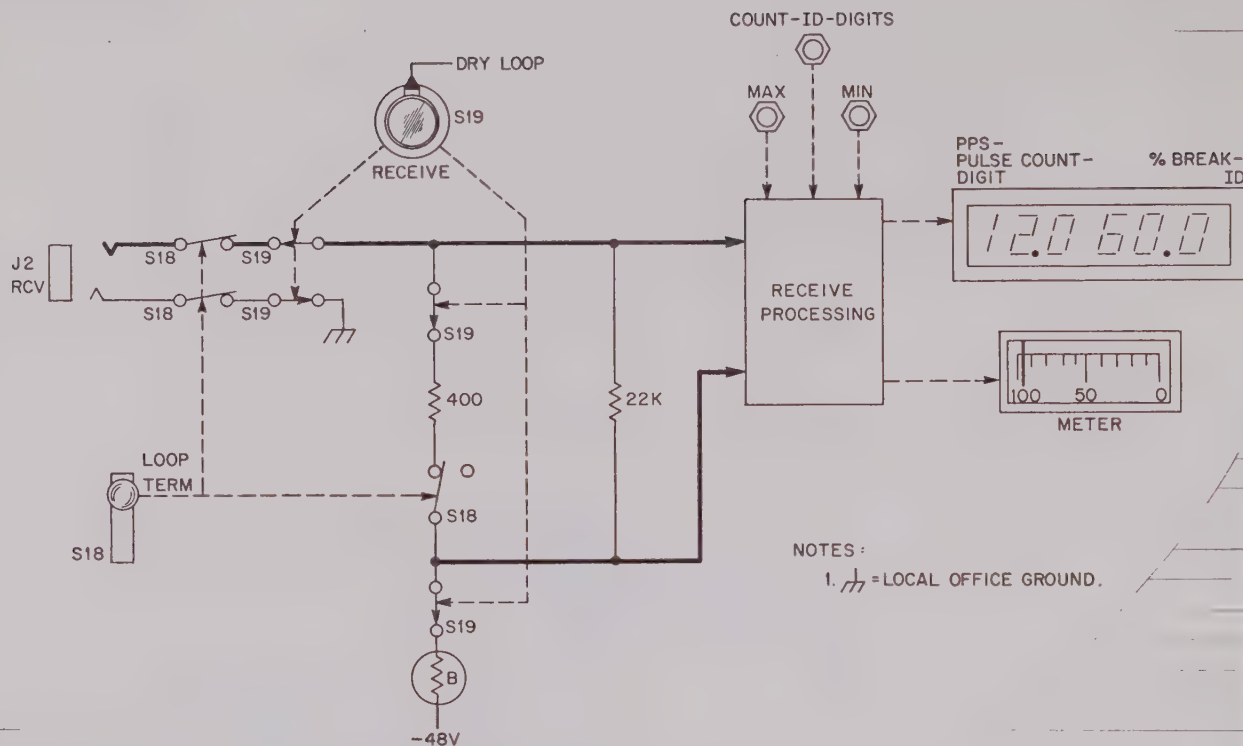


Figure 4-9. Receiving Dry Loop

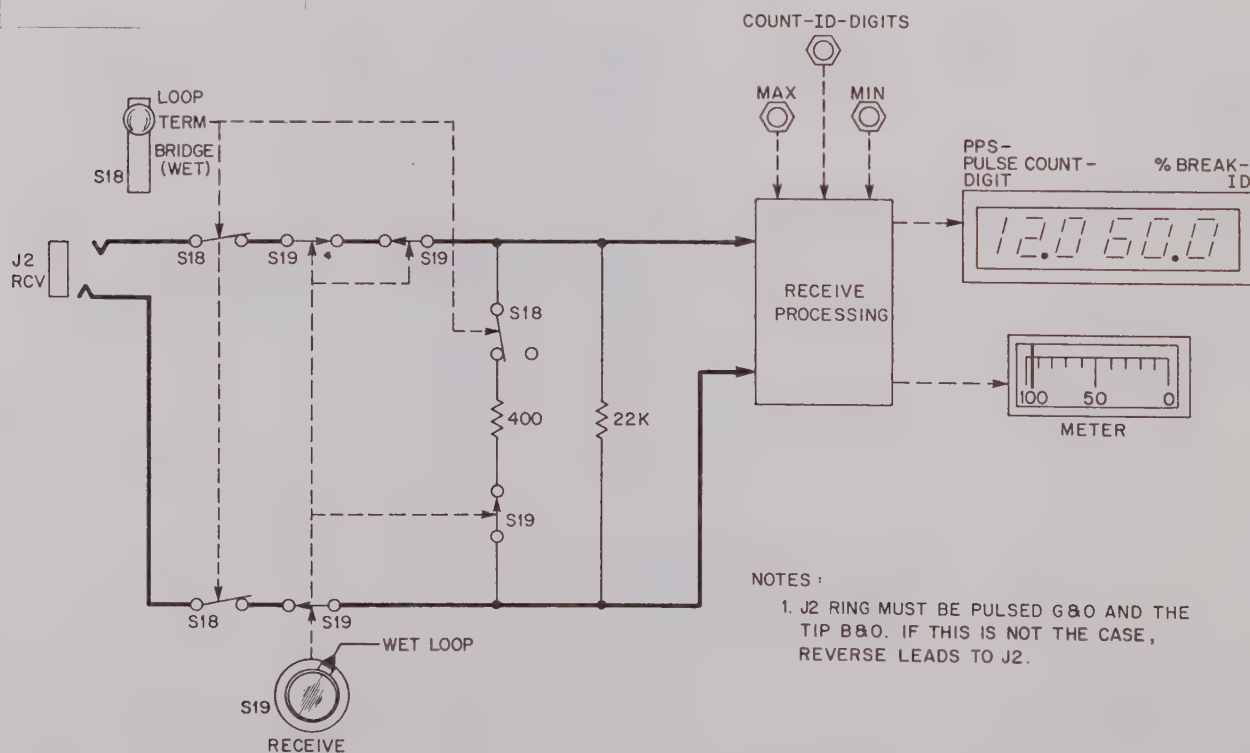


Figure 4-10. Receiving Wet Loop (Battery And Ground)

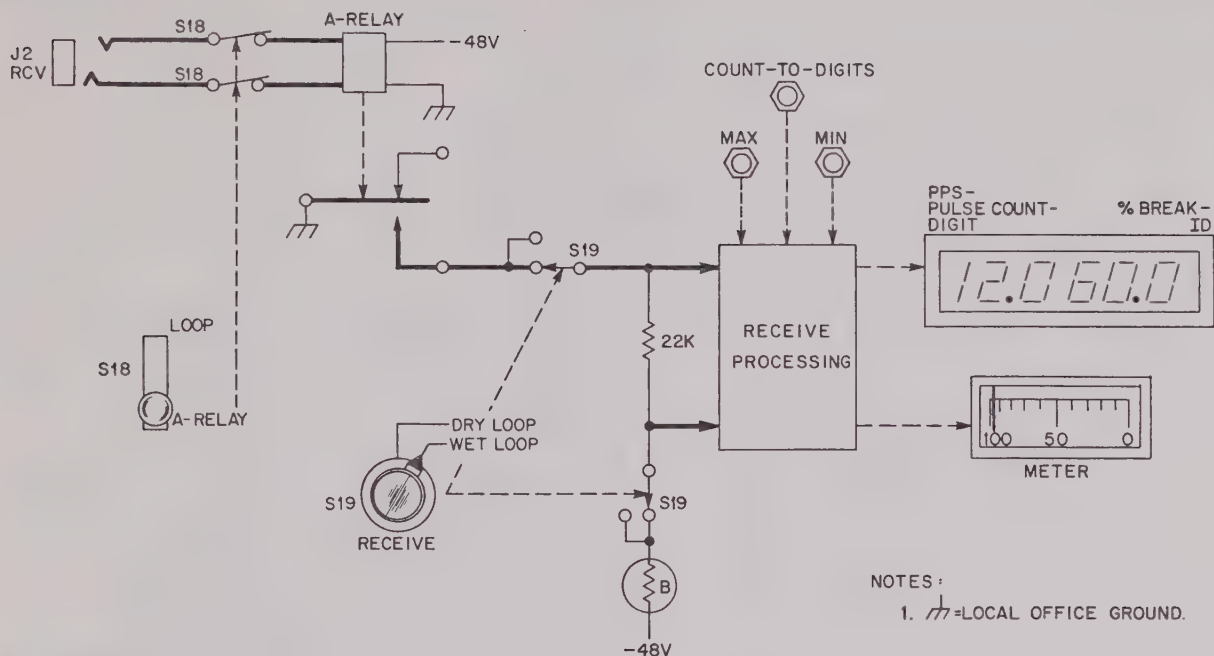


Figure 4-11. Receiving Dry And Wet Loops Through The A-Relay

4.51 RECEIVING E&M

4.52 To receive only (on the E lead from the line or on the M lead from the drop) perform the following steps. See Figure 4-6 for the illustration showing a typical interface between the 1260A and an E&M jack-field. See Figures 4-12 and 4-13 for the illustrations that show the relationship between the LINE and DROP jacks and the internal circuits that define the conditions at the jacks that can be measured.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.
2. Verify that the circuit under test is idle.
3. To receive on the E lead from the line, insert a 310 plug into the E&M LINE jack and connect the other end to the E&M circuit to be measured.
4. To receive on the M lead from the drop, insert a 310 plug into the E&M DROP jack and connect the other end of the cord to the E&M circuit to be measured.

NOTE

The 1260A provides an automatic busy-out in the reverse direction for E&M testing.

5. Set the E&M/LOOP switch to either E&M SEND-RCV position if a low impedance is required.
6. To terminate the circuit under test in a high impedance, set the E&M/LOOP switch to E&M THRU & MON.

7. Turn the RECEIVE dial to either of the E positions or to either of the M positions as required.

8. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

9. If receiving a continuous stream of pulses, the digital display will show the average pulse speed and percent break after 10 pulses have been received and measured. The display will update automatically every 10 pulses thereafter.

10. When either the MAX or the MIN pushbutton is depressed separately, the display will indicate the maximum or minimum speed and percent break measured since the last time the display was cleared. When either pushbutton is depressed, both the speed and percent break are displayed together. This does not imply that they necessarily occurred during the same pulse.

11. If desired, use the METER ADJ control to set the meter indicator-line to agree with the digital display. The meter can be used to observe short-term perturbations in the received percent break. It also provides on-hook and off-hook indications.

12. If receiving and measuring dial-pulsed digits, refer to paragraph 4.15 for a discussion of considerations when sending and receiving dial pulses. Detailed explanation of the use of the COUNT-ID-DIGITS pushbutton, as well as the MAX and MIN pushbuttons, are included in this discussion.

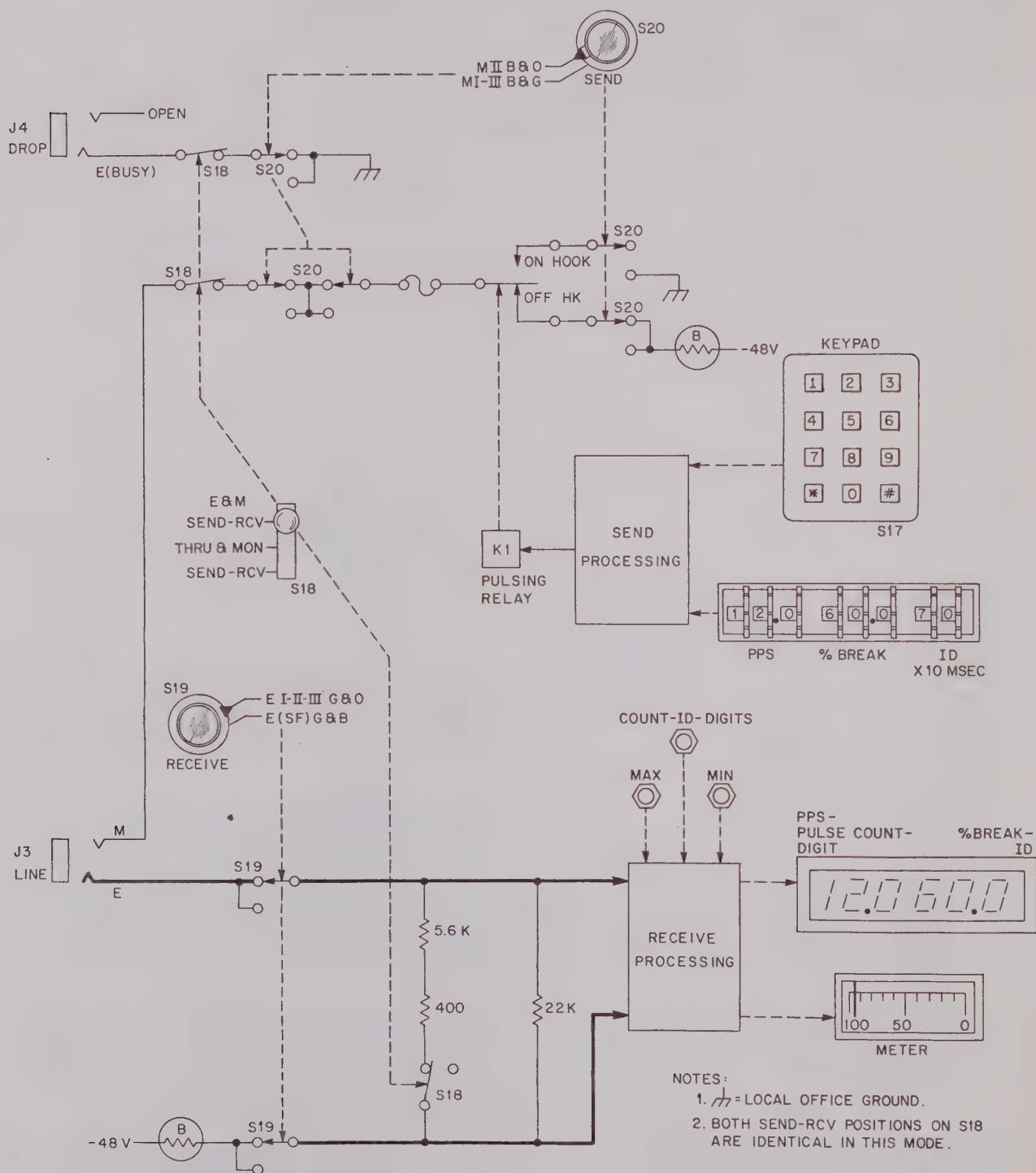


Figure 4-12. Receiving On The E Lead From The Line

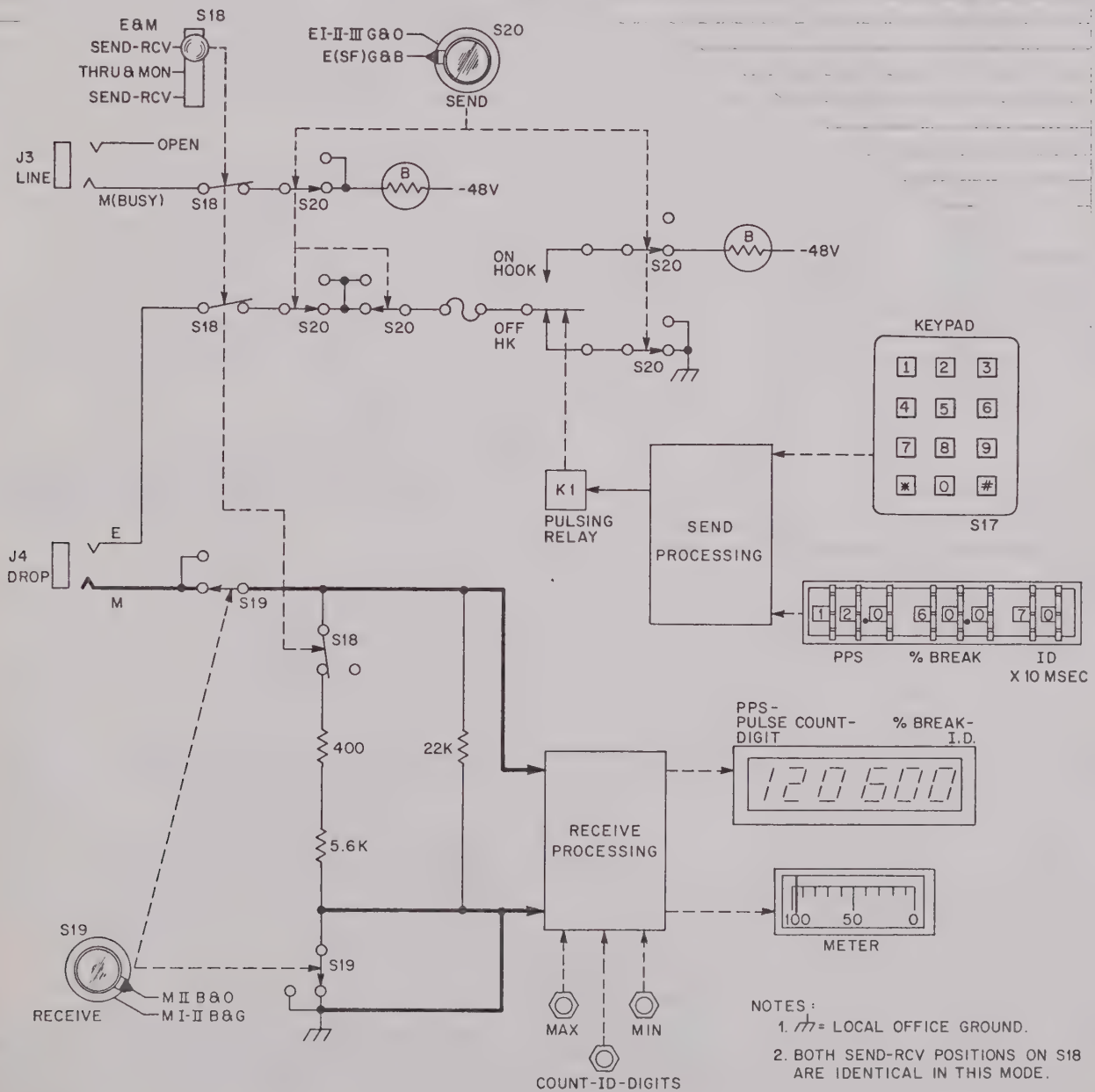


Figure 4-13. Receiving On The M Lead From The Drop

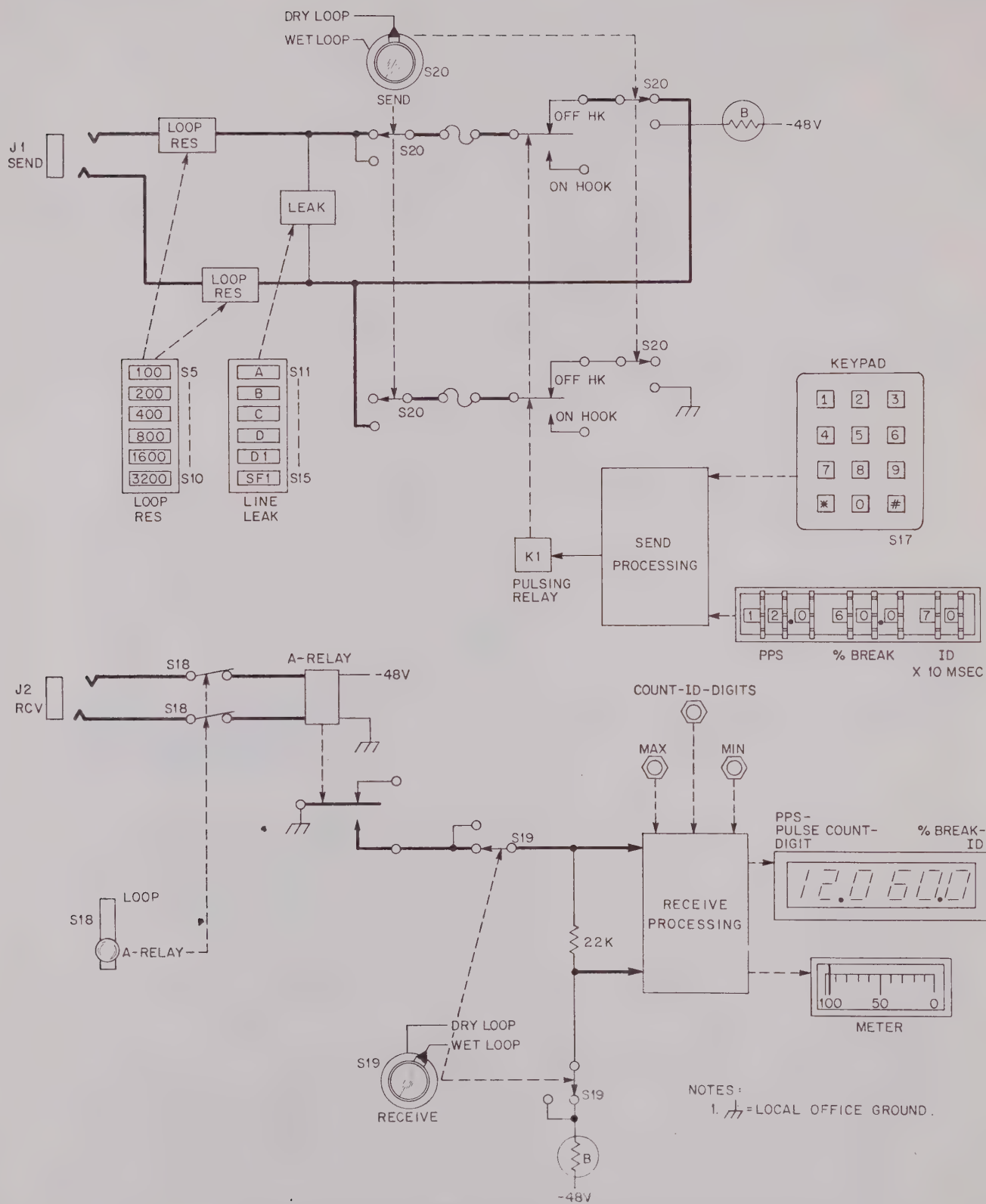


Figure 4-14. Sending Loop While Receiving Through The A-Relay

4.53 SENDING AND RECEIVING LOOP SIMULTANEOUSLY

4.54 When the circuit to be pulsed and the pulsing contacts to be measured are within a reasonable distance of each other, a single 1260A can be used to perform both functions simultaneously. The circuits to be pulsed and measured can also be totally independent. See Figures 4-4, 4-5, 4-9, 4-10, 4-11, and 4-14 for jack and internal circuit configurations for the send and receive loop modes. The dry and wet modes can be mixed in any of the four possible combinations of send and receive. Perform the following steps.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.

2. Verify that the circuit under test is idle.

3. Set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK.

4. Insert a 310 plug into the LOOP SEND jack and connect the other end of the cord to the circuit to be pulsed.

5. Insert a 310 plug into the LOOP RCV jack and connect the other end of the cord to the circuit to be pulsed.

NOTE

If a set of pulsing contacts is **not** conveniently available, switch in the 1260A's internal A-relay by setting the E&M/LOOP switch to LOOP A-RELAY.

6. If a set of pulsing contacts **is** available, set the E&M/LOOP switch to LOOP TERM if a low impedance is required.

7. To terminate the circuit under test in a high impedance, set the E&M/LOOP switch to LOOP BRIDGE (WET).

NOTE

Do **not** bridge on dry loop. If a dry loop is bridged the 1260A shows a continuous off-hook on its analog meter and does not respond to an input. The 1260A will also interfere with a call in this mode.

8. Turn the SEND and RECEIVE dials to either DRY LOOP or WET LOOP as required.

9. If required, depress the appropriate LOOP RES and LINE LEAK pushbuttons.

10. Set the PPS/% BREAK/ID X 10 MSEC thumb-wheel switches as required. Refer to paragraph 4.38 and Figure 4-3 for pulse speed and percent break conditions. Refer to paragraph 4.20 for ID time considerations.

11. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

12. For sending a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT.

13. When receiving a continuous stream of pulses, the digital display will show the average pulse speed and percent break after 10 pulses have been received and measured. The display will update automatically every 10 pulses thereafter.

14. When either the MAX or the MIN pushbutton is depressed separately, the display will indicate the maximum or minimum speed and percent break measured since the last time the display was cleared. When either pushbutton is depressed, both the speed and percent break are displayed together. This does not imply that they necessarily occurred during the same pulse.

15. If desired, use the METER ADJ control to set the meter indicator-line to agree with the digital display. The meter can be used to observe short-term perturbations in the received percent break. It also provides on-hook and off-hook indications.

16. For outputting dialed digits using the keypad, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL.

17. To send, receive, and measure dialed digits in real time, refer to paragraph 4.15 for a discussion of the considerations when sending and receiving dialed pulses.

18. To send, receive, and measure dialed digits using the dial-from-memory feature, refer to paragraph 4.22 for an explanation of the operation of this feature. Also, refer to paragraph 4.15 cited above for a discussion of the considerations when sending and receiving dialed pulses.

4.55 SENDING AND RECEIVING E&M SIMULTANEOUSLY

4.56 When the circuit to be pulsed and the pulsing contacts to be measured are within a reasonable distance of each other, a single 1260A can be used to perform both functions simultaneously. The circuits to be pulsed and measured can also be totally independent. See Figures 4-7, 4-8, 4-12, and 4-13 for the jack

and internal circuit configurations for the send and receive E&M modes. The E&M modes can be mixed in any of the 16 possible combinations. Perform the following steps.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.

2. Verify that the circuit under test is idle.

3. Set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK.

4. To send on the E lead toward the drop and receive on the M lead from the line, insert a 310 plug into the E&M DROP jack and connect the other end of the cord to the E&M circuit to be pulsed and measured.

5. To send on the M lead toward the line and receive on the E lead from the drop, insert a 310 plug into the E&M LINE jack and connect the other end of the cord to the E&M circuit to be pulsed and measured.

NOTE

The 1260A provides an automatic busy-out in the reverse direction for E&M testing.

NOTE

Refer to Table 4-7 for correct jack-ins for all possible combinations of sending and receiving E&M.

6. Set the E&M/LOOP switch to either E&M SEND-RCV position if a low impedance is required.

7. To terminate the circuit under test in a high impedance, set the E&M/LOOP switch to E&M THRU & MON.

8. Turn the SEND dial to any of the four E and M positions as required.

9. Turn the RECEIVE dial to any of the four E and M positions as required.

10. Set the PPS/% BREAK/ID X 10 MSEC thumb-wheel switches as required. Refer to paragraph 4.38 and Figure 4-3 for pulse speed and percent break considerations. Refer to paragraph 4.20 for ID time considerations.

11. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

12. For sending a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT.

13. When receiving a continuous stream of pulses, the digital display will show the average pulse speed and percent break after 10 pulses have been received and measured. The display will update automatically every 10 pulses thereafter.

14. When either the MAX or the MIN pushbutton is depressed separately, the display will indicate the maximum or minimum speed and percent break measured since the last time the display was cleared. When either pushbutton is depressed, both the speed and percent break are displayed together. This does not imply that they necessarily occurred during the same pulse.

15. If desired, use the METER ADJ control to set the meter indicator-line to agree with the digital display. The meter can be used to observe short-term perturbations in the received percent break. It also provides on-hook and off-hook indications.

16. For outpulsing dialed digits using the keypad, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL.

17. To send, receive, and measure dialed digits in real time, refer to paragraph 4.15 for a discussion of the considerations when sending and receiving dialed pulses.

18. To send, receive, and measure dialed digits using the dial-from-memory feature, refer to paragraph 4.22 for an explanation of the operation of this feature. Also, refer to paragraph 4.15 cited above for a discussion of the considerations when sending and receiving dialed pulses.

Table 4-7. E&M Send And Receive Jack Combinations

TO SEND		RECEIVE ON	
LEAD	JACK	LEAD	JACK
E	DROP	E	LINE
M	LINE	M	DROP

4.57 SENDING LOOP AND RECEIVING E&M OR VICE VERSA

4.58 The 1260A provides capability for checking such items as loop-to-E&M converters and E&M-to-loop converters. See Figures 4-15 through 4-20 for illustrations that show the relationships between the jacks and internal circuits that define the conditions that can be sent and those that can be measured. To operate in mixed modes, perform the following steps.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.

2. Verify that the circuit under test is idle.

3. Set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK.

4. **To send loop and receive E&M**, first, insert a 310 plug into the LOOP SEND jack and connect the other end of the cord to the circuit to be pulsed. Then, insert another 310 plug into either the E&M LINE jack to receive on the E lead from the line, or, the E&M DROP jack to receive on the M lead from the drop. Connect the other end of the cord to the circuit to be measured.

NOTE

The 1260A provides an automatic busy-out in the reverse direction for E&M testing.

5. **To send E&M and receive loop**, first, insert a 310 plug into either the E&M DROP jack to send on the E lead toward the drop, or, the E&M LINE jack to send on the M lead toward the line. Connect the other end of the cord to the circuit to be pulsed. Then, insert another 310 plug into the LOOP RCV jack and connect the other end of the cord to the circuit to be measured.

4. Set the E&M/LOOP switch to E&M SEND-RCV/LOOP TERM position.

5. **To send loop and receive E&M**, turn the SEND dial to either DRY LOOP or WET LOOP and the RECEIVE dial to any of the four E and M positions as required.

6. If sending loop, depress the appropriate LOOP RES and/or LINE LEAK pushbuttons as required.

7. **To send E&M and receive loop**, turn the SEND dial to any of the four E and M positions and the RECEIVE dial to either the DRY LOOP or the WET LOOP positions as required.

8. Set the PPS/% BREAK/ID X 10 MSEC thumb-wheel switches as required. Refer to paragraph 4.38 and Figure 4-3 for pulse speed and percent break conditions. Refer to paragraph 4.20 for ID time considerations.

9. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

10. For sending a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT.

11. When receiving a continuous stream of pulses, the digital display will show the average pulse speed and percent break after 10 pulses have been received and measured. The display will update automatically every 10 pulses thereafter.

12. When either the MAX or the MIN pushbutton is depressed separately, the display will indicate the maximum or minimum speed and percent break measured since the last time the display was cleared. When either pushbutton is depressed, both the speed and percent break are displayed together. This does not imply that they necessarily occurred during the same pulse.

13. If desired, use the METER ADJ control to set the meter indicator-line to agree with the digital display. The meter can be used to observe short-term perturbations in the received percent break. It also provides on-hook and off-hook indications.

14. For outputting dialed digits using the keypad, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL.

15. To send, receive, and measure dialed digits in real time, refer to paragraph 4.15 for a discussion of the considerations when sending and receiving dialed pulses.

16. To send, receive, and measure dialed digits using the dial-from-memory feature, refer to paragraph 4.22 for an explanation of the operation of this feature. Also, refer to paragraph 4.15 cited above for a discussion of the considerations when sending and receiving dialed pulses.

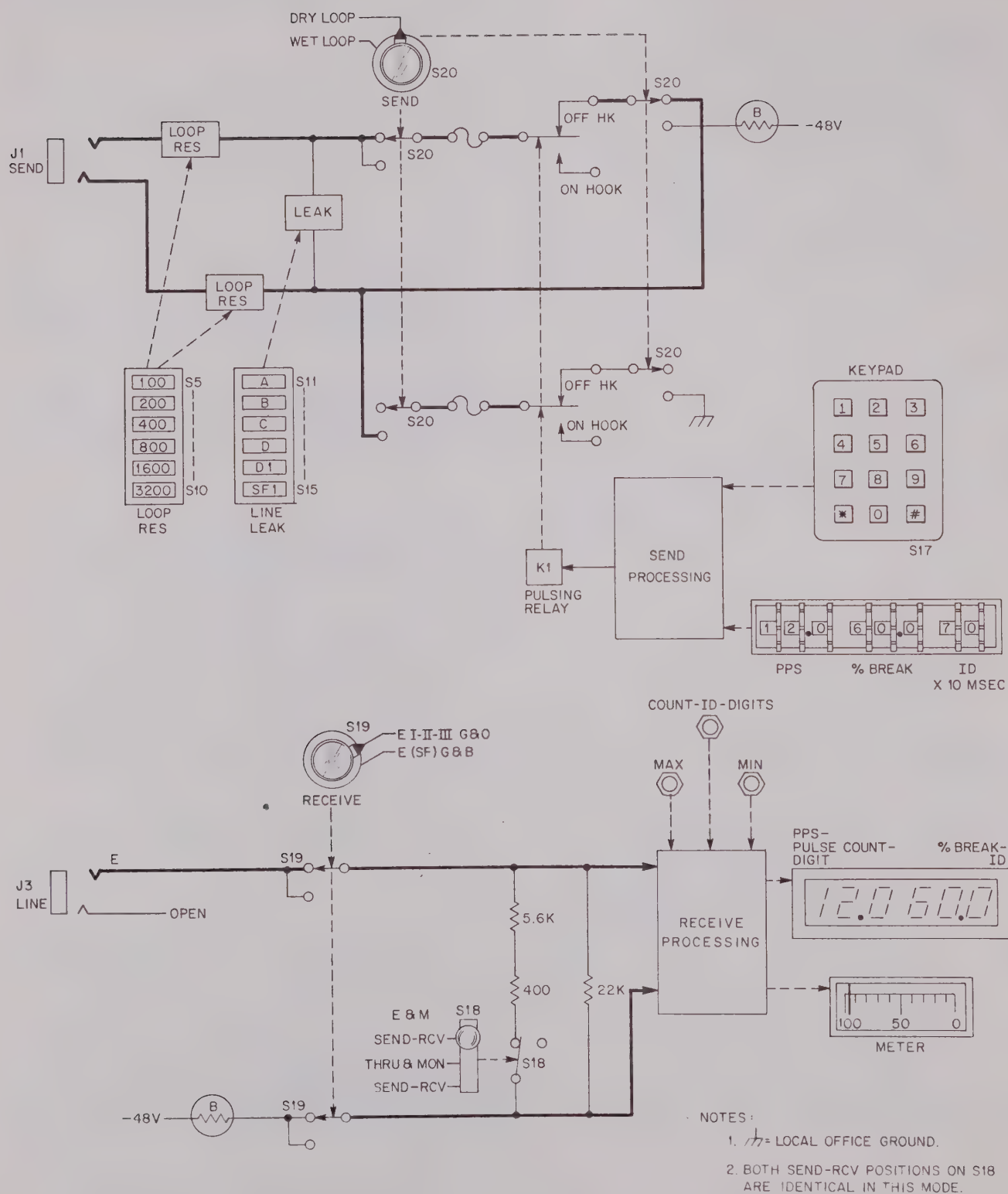


Figure 4-15. Sending Loop While Receiving On The E Lead



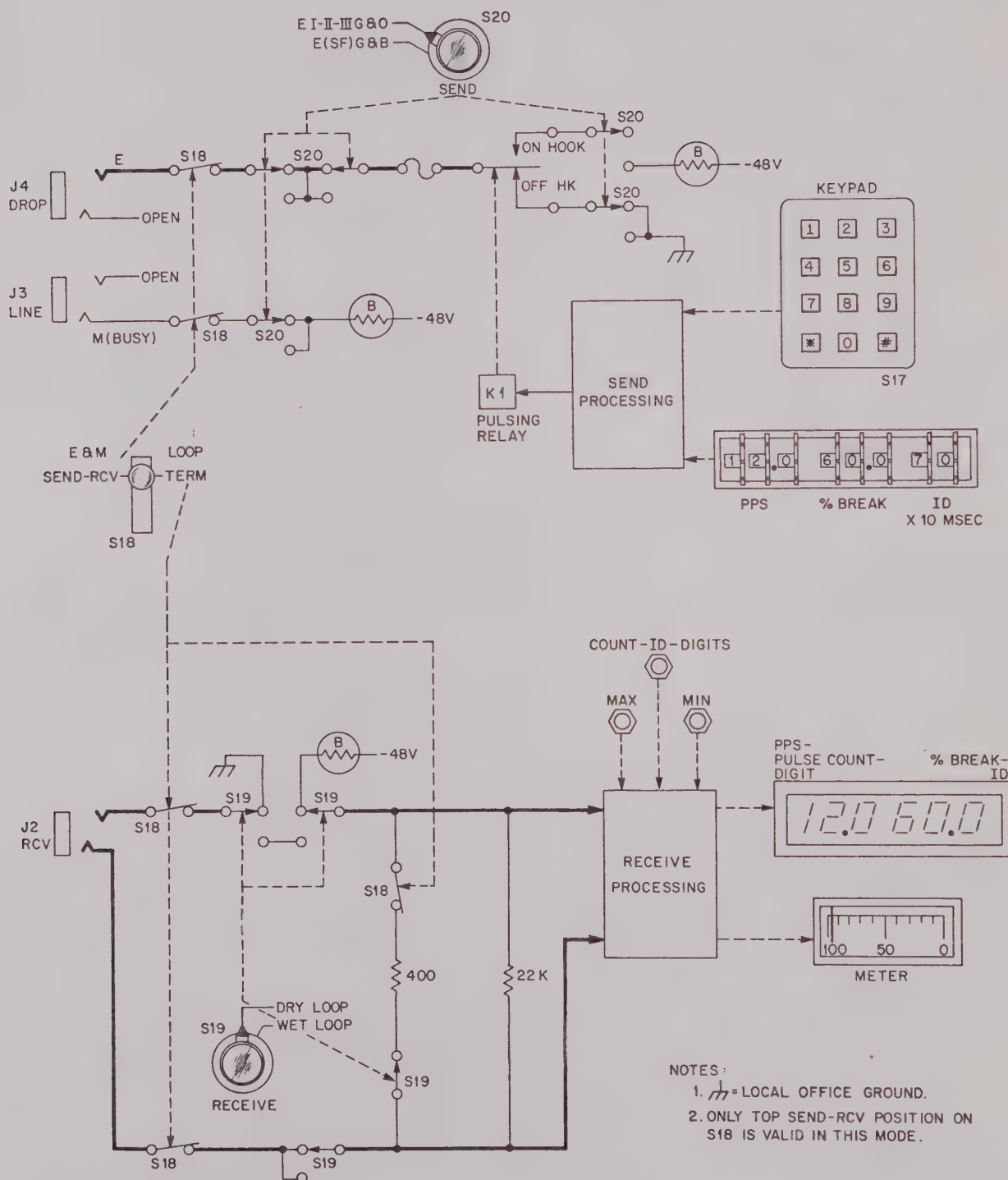


Figure 4-17. Sending On The E Lead While Receiving Loop

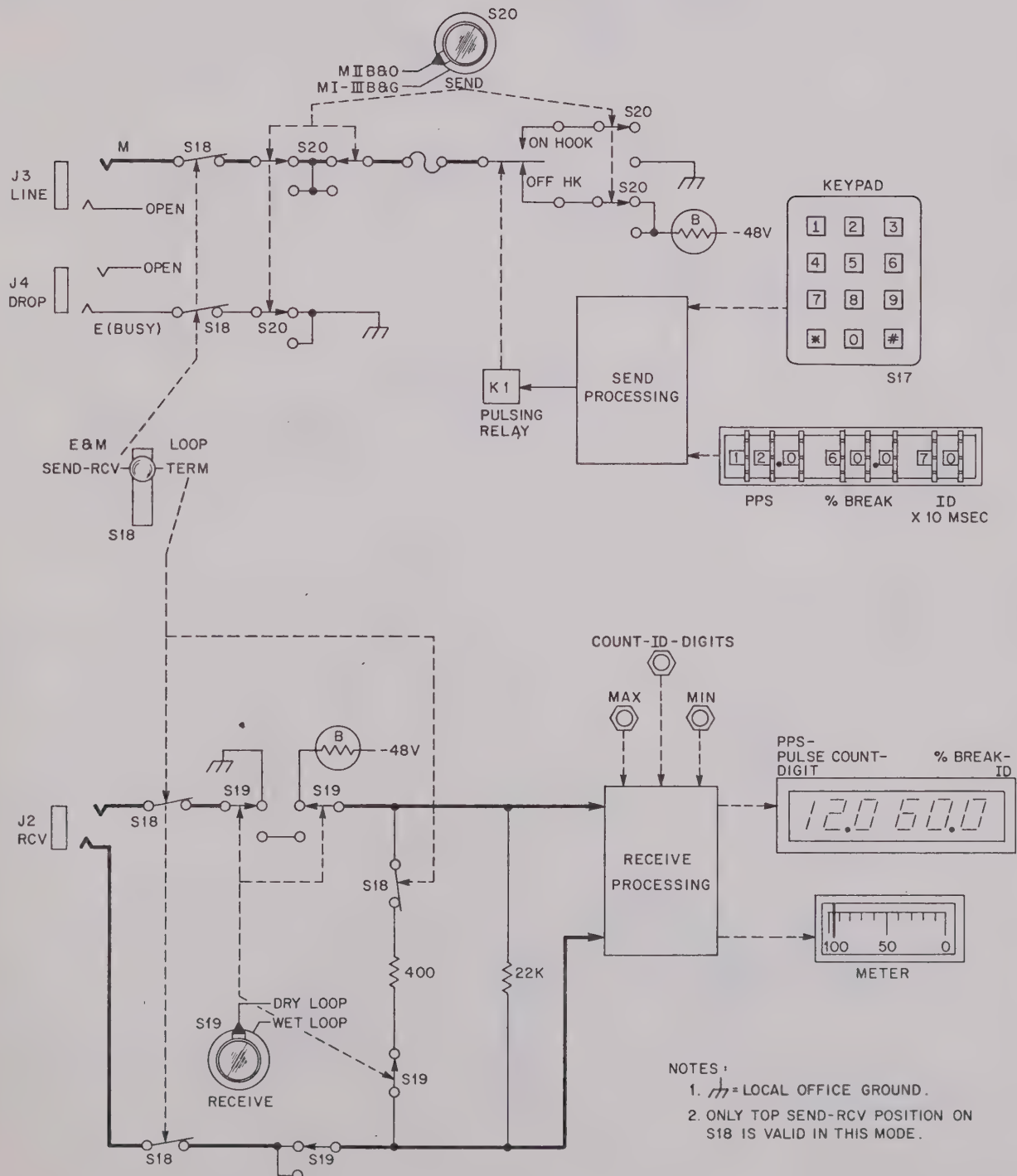


Figure 4-18. Sending On The M Lead While Receiving Loop

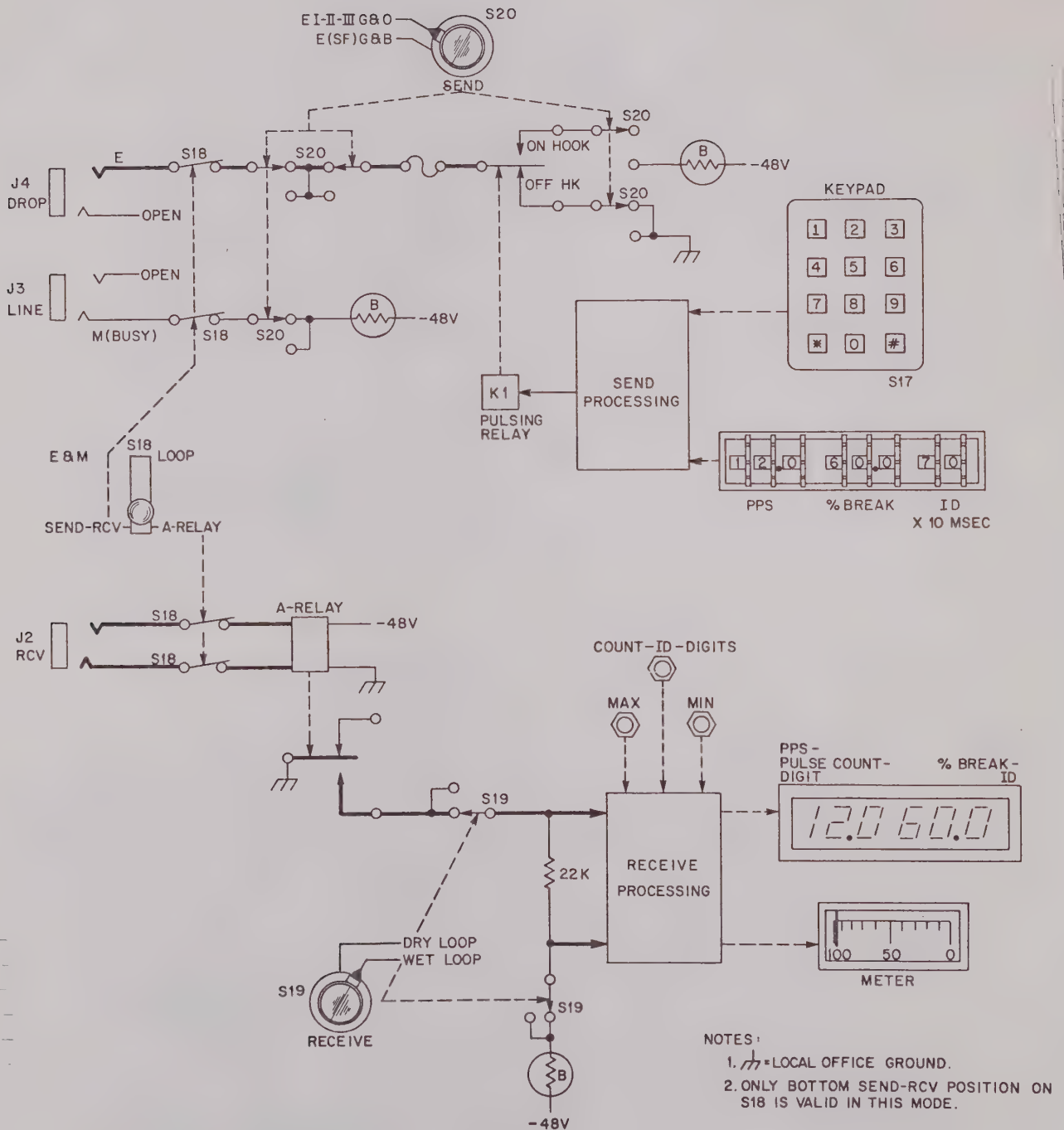


Figure 4—19. Sending On The E Lead While Receiving Dry Or Wet Loop Through The A-Relay

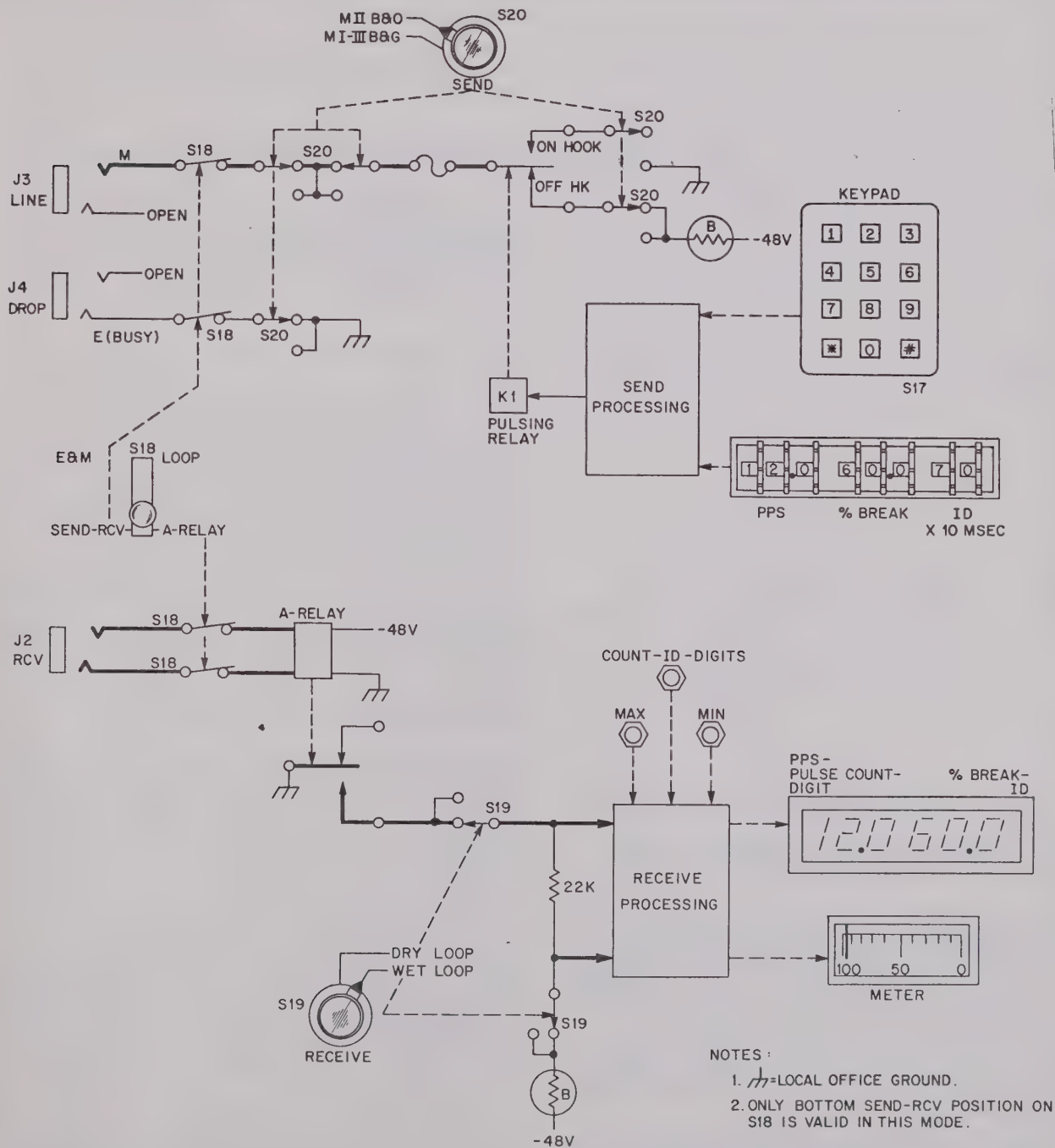


Figure 4-20. Sending On The M Lead While Receiving Dry Or Wet Loop Through The A-Relay

4.59 TESTING SPLIT COIL PULSING RELAYS

4.60 When testing a split coil pulsing relay, it may be difficult to disconnect the coil wires so that the 1260A can be used to pulse the relay. To use the 1260A to measure the pulsing speed and percent break of the driving relay contacts and the driven relay contacts without disconnecting any wires, perform the following steps.

1. Set the E&M/LOOP switch to the LOOP BRIDGE position.

2. The driving relay pulsing can be measured either at point A or point B shown on Figure 4-22. If point A is used, connect point A to the ring (M lead) of the E&M DROP jack and set the RECEIVE switch to the M-I-I B&G position. If point B is used, connect point B to the tip (E lead) of the E&M LINE jack and set the RECEIVE switch to the E (SF) G&B position. The pulsing speed, percent break, and interdigital time will be displayed.

3. Measure the driven contacts as instructed in paragraph 4.49.

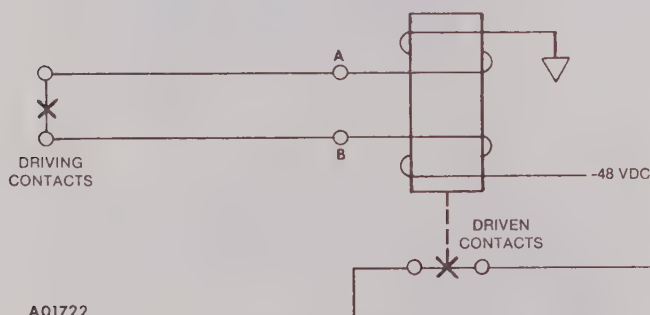


Figure 4-21. Testing Split Coil Relays

4.61 USING THE 1260A AS A PRECISION LOOP DIALER WITH MONITOR FEATURES

4.62 When using the 1260A as a dialer, it may be desirable to employ a lineman's handset for monitoring and/or talking on the circuit under test. This is for two wire circuits only. To use a lineman's handset, perform the following steps.

1. Plug the circuit to be tested into the 1260A's LOOP SEND jack.

2. Plug the lineman's handset into the 1260A's LOOP RCV jack.

3. Set the E&M/LOOP switch to the LOOP TERM position.

4. Use the dial keypad on the 1260A to dial the desired number such as a milliwatt used to confirm the connection.

5. As soon as the connection is established, quickly set the E&M/LOOP switch to the LOOP BRIDGE position. This connects the LOOP RCV and the LOOP SEND jacks in parallel so that the lineman's handset holds the circuit.

6. The handset can now be used for talking or monitoring on the circuit under test.

4.63 GENERAL SF OPERATING CONSIDERATIONS

4.64 Paragraphs 4.64 through 4.76 contain a set of general operating considerations for the SF module that are referenced throughout the more detailed operating procedures contained in paragraphs 4.77 through 4.90.

4.65 POWER CONSIDERATIONS

4.66 The SF module is driven by the 1260A. The module plugs directly into either of the two front panel slots of the 1260A.

4.67 CONSIDERATIONS WHEN SENDING AND RECEIVING SF

4.68 When sending SF, the transmit levels are fixed at nominal 4-wire circuit TLP SF levels. These are determined by the positions of the SEND RCV LINE/MON/SEND RCV DROP switch on the SF module and the ON HOOK/OFF HK+DIAL/CONT switch on the mainframe. Refer to the table in Figure 4-22.

4.69 Deviation from these nominal SF send levels, for purpose of margin testing, is provided by the DEV FR SND TLP dial. This dial allows levels 1 to +7 dB's (in 2 dB steps) and 1 to -11 dB's (in 1 dB steps) above and below the fixed nominal levels.

4.70 When the SEND dial is set to E (SF) G&B and a cord is plugged into SF SEND, the 1260A is enabled to send SF pulsing and disabled from sending E G&B. Likewise, when the RECEIVE dial is set to E (SF) G&B and a cord is plugged into SF RCV, the 1260A is enabled to measure SF pulsing and disabled from measuring E B&G pulsing.

4.71 A supervision lamp indicates when SF is present at the RCV jack. It will pulse when SF dialing is present.

4.72 An EXT OSC jack allows for insertion of SF tones other than 2600 or 2400 Hz.

Table 4—8. Numbers, Functions, And Positions Of The Internal DIP Multiple Switch In The SF Module

SWITCH NUMBERS†	ON POSITION	OFF POSITION
S1.1 and S1.2	* Permits sending at 2600Hz	Permits sending at 2400 Hz
S1.3 and S1.4	Delay for SF augmentation removed.	* SF augmentation delay in
S1.6 and S1.7	Wideband filter switched in (1500 Hz to 4000 Hz)	* Narrowband filter switched in (2600 Hz $\pm$ 30Hz)
* SF module shipped in this position. † S1.5 and S1.8 are not used.		

4.73 EXPLANATION OF THE INTERNAL DIP MULTIPLE SWITCH

4.74 The internal DIP multiple switch cuts in or out three separate options: (a) selection between 2600 or 2400 Hz send frequency, (b) selection between SF augmentation delay or the removal of that delay, and (c) selection between a 2600 Hz $\pm$ 30Hz narrow-band filter or a 1500Hz to 4000 Hz wide-band filter. Table 4—8 lists the switch numbers, functions, and positions.

4.75 To change settings on the internal DIP multiple switch proceed as follows:

1. Pull the SF module out from the 1260A mainframe.
2. Remove the two unhinged screws from the smaller of the two printed circuit boards. (The two hinged screws remain in place).
3. The DIP multiple switch is located on this smaller board in the bottom left corner **after** the board is folded back.
4. Change the switches as desired. Table 4—8 lists the needed information.
5. Return the smaller board to the proper position and replace the two unhinged screws.
6. Slide the SF module back into its slot in the 1260A mainframe.

4.76 SF OPERATING PROCEDURES

4.77 Paragraphs 4.81 through 4.90 provide operating procedures for using the Model 1260A SF module in

all of its send only, receive only, send and receive simultaneously, and mixed-mode operations such as sending E&M and receiving SF. Paragraph 4.79 is a self-check that can be performed at any time to verify that the unit is operating properly.

NOTE

The SF module, being a plug-in unit, is powered directly by the 1260A mainframe. For the procedures that follow, it is assumed that the proper power connections have been made. Refer to paragraph 4.66 for a discussion of power considerations and procedures.

4.78 SF SELF CHECK

4.79 Perform the following steps to check out the SF send and receive sections. See Figure 4—22.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.
2. Using a cord equipped with 310 plugs, insert one plug into the SF SEND jack and the other into the SF RCV jack.
3. Set the DEV FR SND TLP dial on the SF module to the zero dB setting. Refer to paragraph 4.69 for considerations when using the DEV FR SND TLP dial.
4. Set the SF SEND RCV LINE/MON/SEND RCV DROP switch to SEND RCV DROP.
5. Set the E&M/LOOP switch to E&M SEND-RCV/ LOOP TERM.



6. Turn the SEND and RECEIVE dials to E (SF) G&B.

7. Set the PPS/% BREAK/ID X 10 MSEC thumbwheel switches to some convenient combination such as 12 pps at 60 percent break and 700 msec. Refer to paragraph 4.38 and Figure 4-3 for pulse speed and percent break considerations. Refer to paragraph 4.20 for ID time considerations. These references pertain to the mainframe. For specific questions on SF range limitations, refer to the SF specifications in Table 2-3.

8. Set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK. The SF CKT IDLE lamp should light indicating the presence of steady-tone SF (circuit idle).

9. Set the ON HOOK/OFF HK + DIAL/CONT switch to CONT.

10. Depress the MAX and MIN pushbuttons simultaneously to clear the display. The speed and percent break set on the thumbwheel switches should now appear on the digital display. Acceptable accuracy is ± 0.2 pps for 4 to 14 pps settings and $\pm 1.2\%$ break for 50 to 75% break settings. ($\pm 2.0\%$ break for 10 to 50% break and 75 to 89.9% break settings).

11. Depress and hold the MAX pushbutton. The display should agree with the values set on the thumbwheels for both the speed and percent break. Acceptable accuracy is ± 0.2 pps for 4 to 14 pps settings and $\pm 1.2\%$ break for 50 to 75% break settings. ($\pm 2.0\%$ break for 10 to 50% break and 75 to 89.9% break settings).

12. Depress and hold the MIN pushbutton. The display should agree with the values set on the thumbwheels for both the speed and percent break. Acceptable accuracy is ± 0.2 pps for 4 to 14 pps settings and $\pm 1.2\%$ break for 50 to 75% break settings. ($\pm 2.0\%$ break for 10 to 50% break and 75 to 89.9% break settings).

13. Set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL.

14. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

15. On the keypad, depress any numbered key other than "1". The display should agree with the values set on the thumbwheels for both speed and percent break. Acceptable accuracy is ± 0.2 pps for 4 to 14 pps settings and $\pm 1.2\%$ break for 50 to 75% break settings. ($\pm 2.0\%$ break for 10 to 50% break and 75 to 89.9% break settings).

16. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

17. Load digits into the keypad memory by depressing the "*" key first. The STORE DIGITS lamp should start flashing, indicating that the keypad is in the loading mode. Refer to paragraph 4.22 for a fuller explanation of the keypad dial-from-memory feature.

18. Depress keys 1 through 0 in order.

19. Exit loading mode by depressing "*" again. The STORE DIGITS lamp should remain lit.

20. Outpulse stored digits by depressing the "#" key. The speed and percent break should update for every digit greater than one.

21. Depress the MAX and MIN pushbuttons one at a time. The display will indicate the maximum or minimum speed and percent break respectively that has been measured since the last time both pushbuttons were depressed simultaneously. The speed and percent break displayed did not necessarily occur during the same pulse. Acceptable accuracy is ± 0.2 pps for 4 to 14 pps settings and $\pm 1.2\%$ break for 50 to 75% break settings. ($\pm 2.0\%$ break for 10 to 50% break and 75 to 89.9% break settings).

22. Depress the MAX and MIN pushbuttons one at a time. The display will indicate the maximum or minimum speed and percent break measured since the last time the display was cleared. The speed and percent break displayed did not necessarily occur during the same pulse. Acceptable accuracy is ± 0.2 pps for 4 to 14 pps settings and $\pm 1.2\%$ break for 50 to 75% break settings. ($\pm 2.0\%$ break for 10 to 50% break and 75 to 89.9% break settings).

23. Depress and hold the COUNT-ID-DIGITS pushbutton. The left-hand side of the display will show the updated pulse count. The right-hand side of the display will show the minimum ID (interdigital) time received. Acceptable accuracy for ID time is ± 3.0 msec.

24. Step through the rest of the digits entered by repeatedly releasing, then, within two seconds, depressing and holding, the COUNT-ID-DIGITS pushbutton. The ID times displayed should all be ± 3.0 msec of the value set on the thumbwheels. Since no other pulses follow it, the last digit entered will not have an ID time following it to display. A "999" will flash on the right side of the display instead. Refer to paragraph 4.20 and Table 4-6 for a further explanation.

4.80 SENDING SF

4.81 To send either steady-tone SF, continuous SF pulsing, or dialed SF pulsing; perform the following steps. See the top portions of Figures 4-23 and 4-24 for the illustrations showing the relationships between the SF SEND jack and the internal circuits that define the conditions appearing at the tip and ring.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.

2. Verify that the circuit under test is idle.

3. Turn the DEV FR SND TLP dial on the SF module to the required output level.

4. Insert a 310 plug into the SF SEND jack and connect the other end of the cord to the circuit that SF is to be sent on.

5. Set the SF SEND RCV LINE/MON/SEND RCV DROP switch to either SEND RCV LINE or SEND RCV DROP as required.

6. Turn the SEND dial to E (SF) G&B.

7. Set the PPS/% BREAK/ID X 10 MSEC thumb-wheel switches as required. Refer to paragraph 4.38 and Figure 4-3 for pulse speed and percent break considerations. Refer to paragraph 4.20 for ID time considerations.

8. To send steady-tone SF, set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK.

9. To send continuous SF pulsing, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT.

10. To send SF dialed-pulses using the keypad, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. If outpulsing in real time, refer to paragraph 4.15 for considerations when sending and receiving dialed pulses. If outpulsing from memory, refer to paragraph 4.22 for an explanation of the keypad dial-from-memory feature as well as paragraph 4.15 cited above.

4.82 RECEIVING SF

4.83 To receive either steady-tone or pulsed SF, perform the following steps. See the bottom portions of Figures 4-25 and 4-26 for the illustrations that show the SF RCV jack in relation to the internal circuits that define the measureable conditions at the tip and ring.

NOTE

There are certain combinations of pulsing speed and percent break that the 1260A can-

not measure. Refer to paragraph 4.38 and Figure 4-3 for the information. Refer to paragraph 4.20 for detailed information on measurable ID times and considerations.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.

2. Verify that the circuit under test is idle.

3. Insert a 310 plug into the SF RCV jack and connect the other end of the cord to the circuit to be measured.

4. Set the SF SEND RCV LINE/MON/SEND RCV DROP switch to either SEND RCV LINE or SEND RCV DROP as required.

5. Set the E&M/LOOP switch to E&M SEND-RCV/LOOP TERM if a low impedance is required.

6. To terminate the circuit under test in a high impedance, set the E&M/LOOP switch to E&M THRU & MON/LOOP BRIDGE (WET).

7. Turn the RECEIVE dial to E (SF) G&B.

8. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

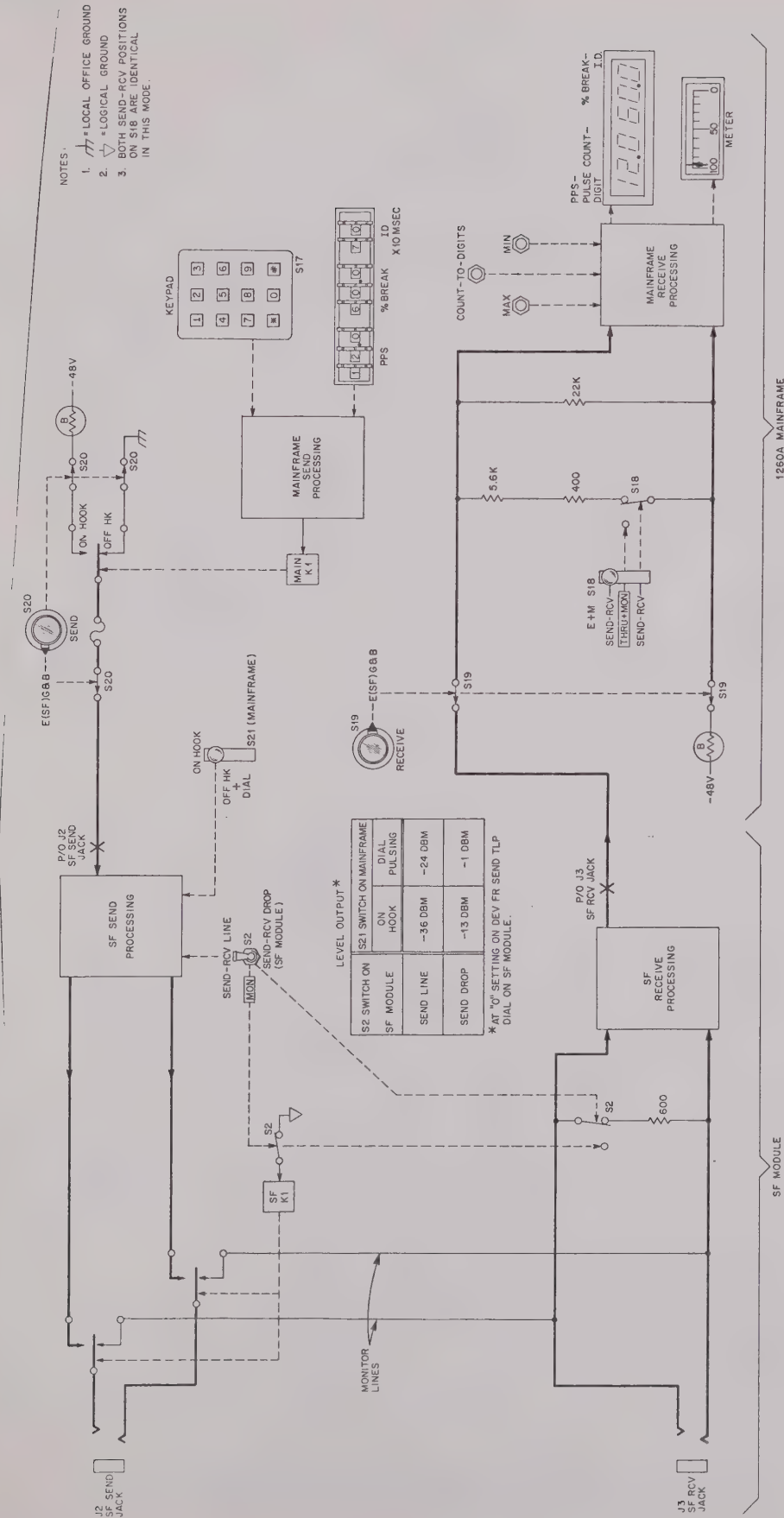
9. When steady-tone SF is received the CKT IDLE lamp on the SF module will light and remain lit indicating an idle circuit.

10. When receiving a continuous stream of SF pulses, the digital display will show the average pulse speed and percent break after 10 pulses have been received and measured. The display will update automatically every 10 pulses thereafter.

11. When either the MAX pushbutton is depressed separately, the display will indicate the maximum or minimum speed and percent break measured since the last time the display was cleared. When either pushbutton is depressed, both the speed and percent break are displayed together. This does not imply that they necessarily occurred during the same pulse.

12. If desired, use the METER ADJ control to set the meter indicator-line to agree with the digital display. The meter can be used to observe short-term perturbations in the received percent break. It also provides on-hook and off-hook indications.

13. If receiving and measuring SF dial-pulsed digits, refer to paragraph 4.15 for a discussion of considerations when sending and receiving dial pulses. Detailed explanation of the use of the COUNT-ID-DIGITS pushbutton, as well as the MAX and MIN pushbuttons, are included in this discussion.



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Figure 4-22. Sending And Receiving SF

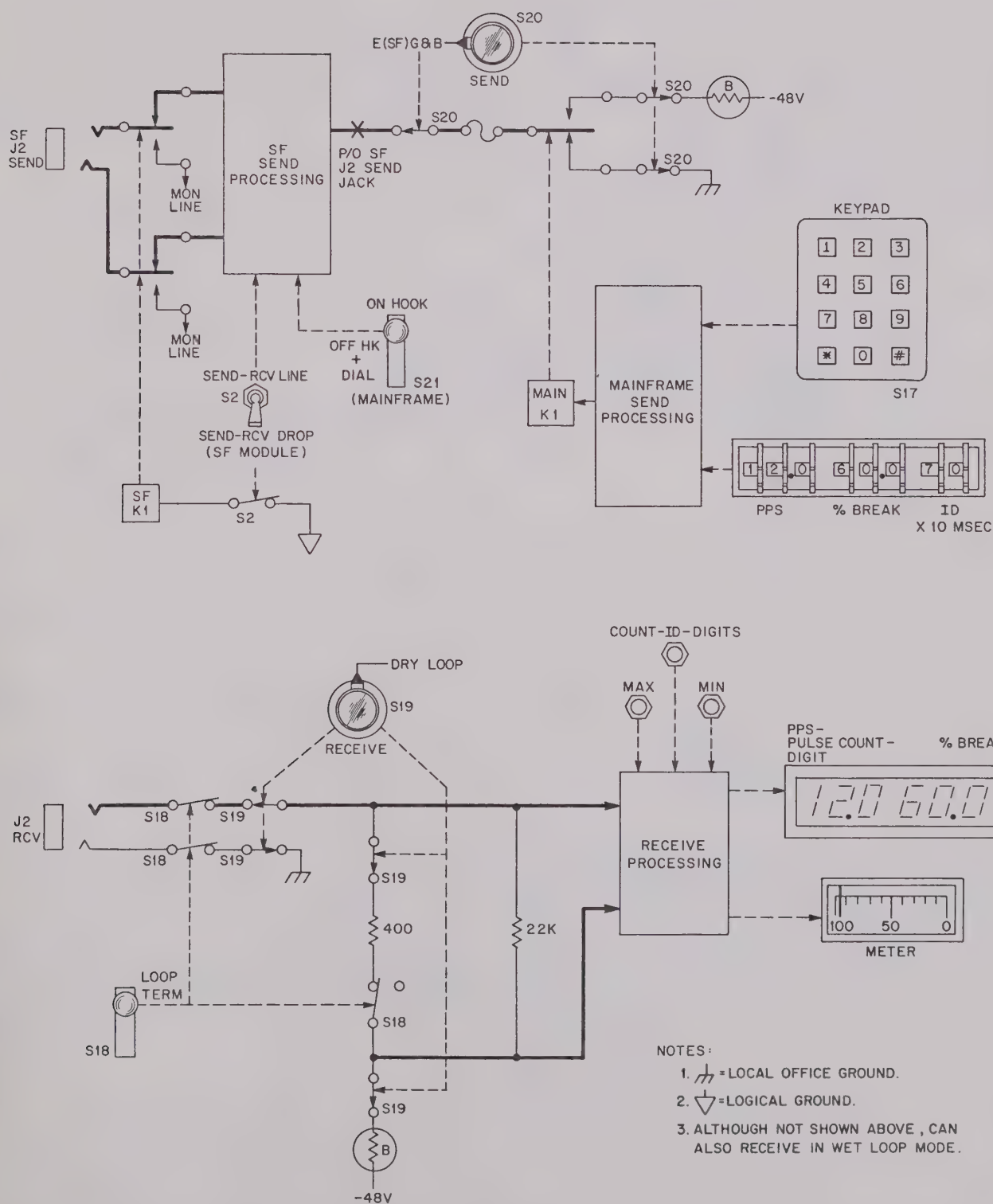


Figure 4-23. Sending SF While Receiving Dry Loop

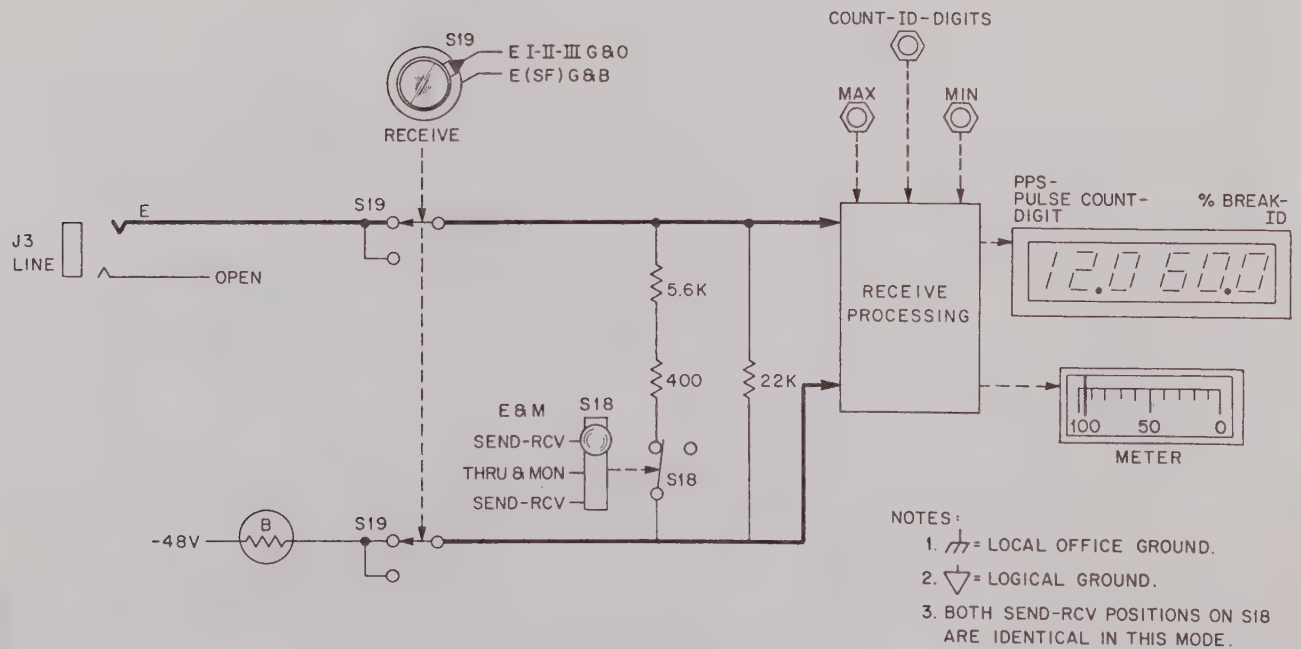
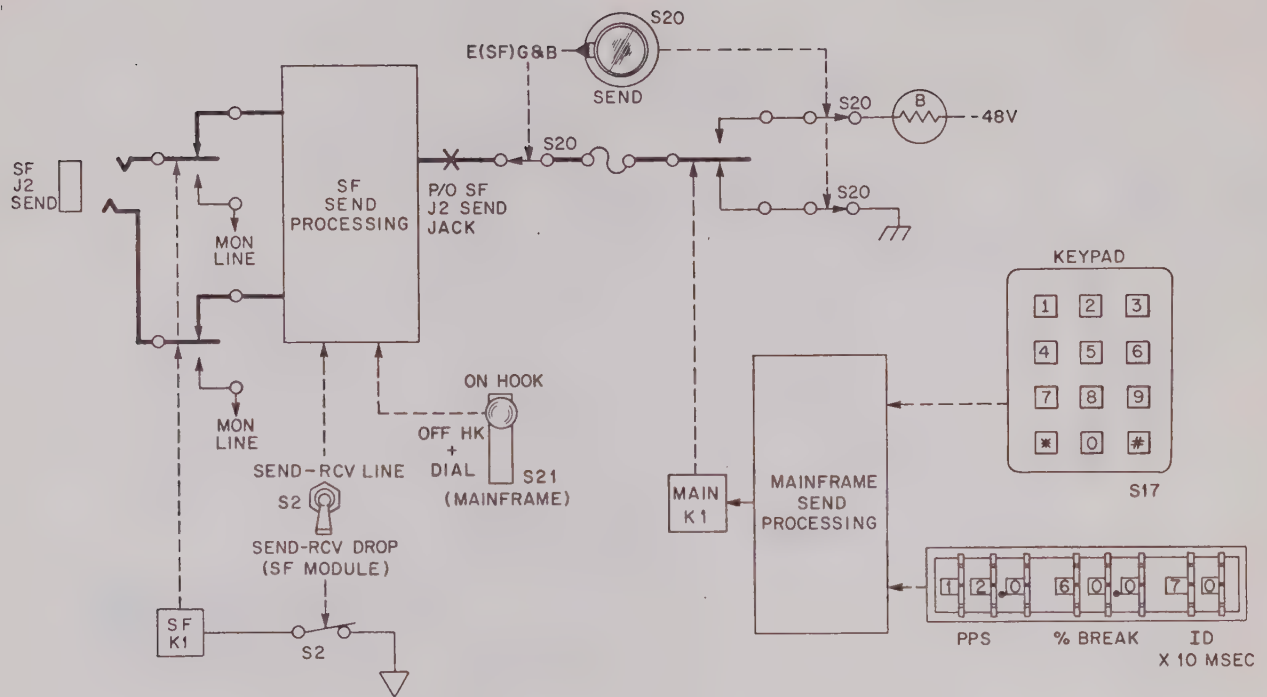


Figure 4-24. Sending SF While Receiving On The E Lead

4.84 SENDING AND RECEIVING SF SIMULTANEOUSLY

4.85 The 1260A with the SF module can be used to both send and receive steady-tone or pulsed SF simultaneously. The circuits sending or receiving either steady-tone or pulsed SF can be totally independent. See Figure 4-22 for jack and internal circuit configuration for the send and receive SF modes. To use, perform the following steps.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.

2. Verify that the circuit(s) under test are idle.

3. Insert a 310 plug into the SF SEND jack and connect the other end of the cord to the circuit to have SF transmitted on it.

4. Insert a 310 plug into the SF RCV jack and connect the other end of the cord to the circuit to be measured.

5. Turn the DEV FR SND TLP dial on the SF module to the required output level.

6. Set the SF SEND RCV LINE/MON/SEND RCV DROP switch to either SEND RCV LINE or SEND RCV DROP as required.

7. Set the E&M/LOOP switch to E&M SEND-RCV/LOOP TERM if a low impedance is required.

8. To terminate the circuit under test in a high impedance, set the E&M/LOOP switch to E&M THRU & MON/LOOP BRIDGE.

9. Turn both the SEND and RECEIVE dials to E (SF) G&B.

10. Set the PPS/% BREAK/ID X 10 MSEC thumb-wheel switches as required. Refer to paragraph 4.38 and Figure 4-3 for pulse speed and percent break considerations. Refer to paragraph 4.20 for ID time considerations.

11. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

12. To send steady-tone SF, set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK.

13. To send continuous SF pulsing, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT.

14. When receiving a continuous stream of SF pulses, the digital display will show the average pulse speed and percent break after 10 pulses have been received and measured. The display will update automatically every 10 pulses thereafter.

15. When either the MAX or the MIN pushbutton is depressed separately, the display will indicate the maximum or minimum speed and percent break measured since the last time the display was cleared. When either pushbutton is depressed, both the speed and percent break are displayed together. This does not imply that they necessarily occurred during the same pulse.

16. If desired, use the METER ADJ control to set the meter indicator-line to agree with the digital display. The meter can be used to observe short-term perturbations in the received percent break. It also provides on-hook and off-hook indications.

17. To send SF dialed pulses using the keypad, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL.

18. To send, receive, and measure SF dialed digits in real time, refer to paragraph 4.15 for a discussion of the considerations when sending and receiving dialed pulses.

19. To send, receive, and measure SF dialed digits using the dial-from-memory feature, refer to paragraph 4.22 for an explanation of the operation of the feature. Also refer to paragraph 4.15 cited above for a discussion of the considerations when sending and receiving dialed pulses.

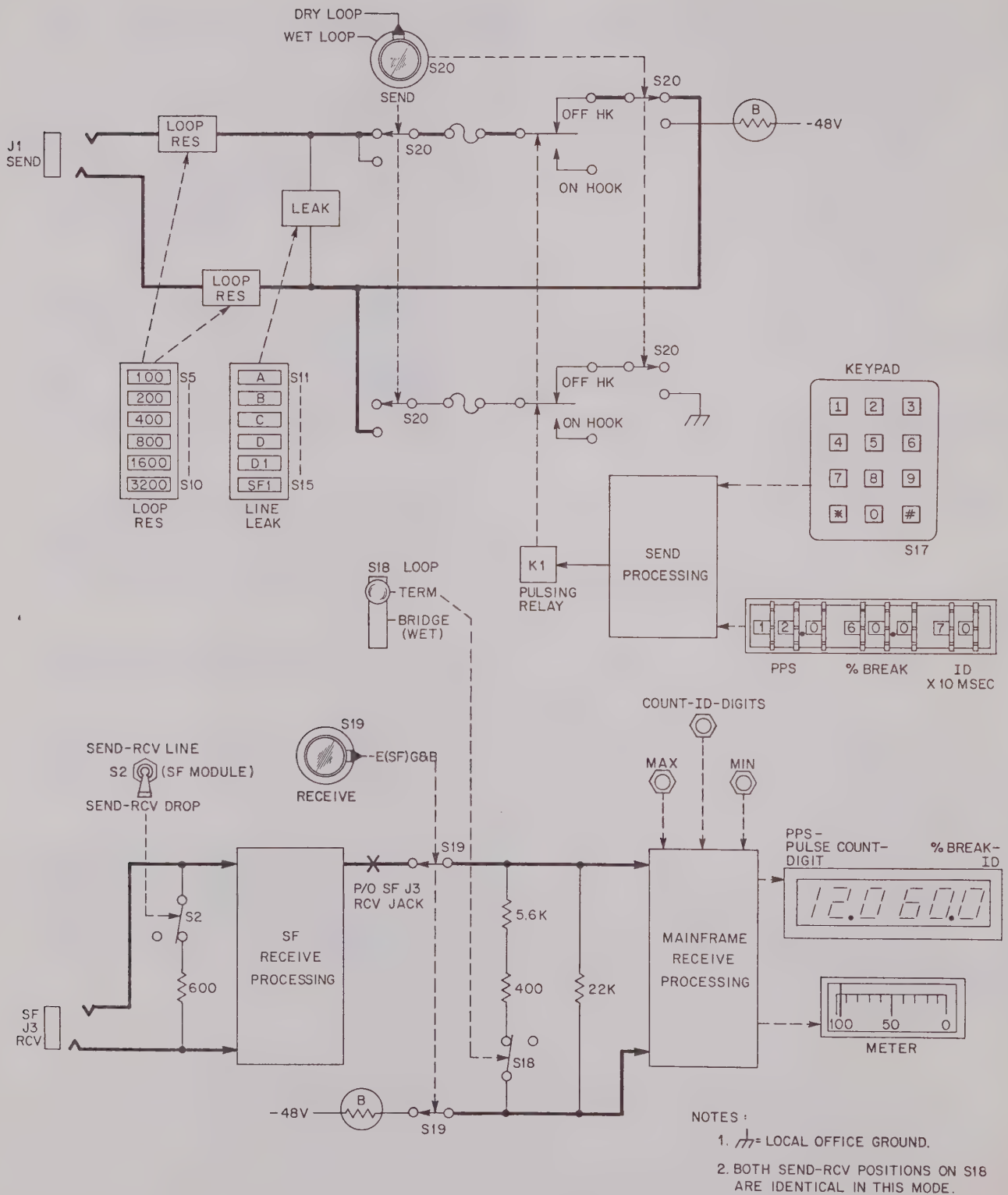


Figure 4-25. Sending On Loop While Receiving Through SF

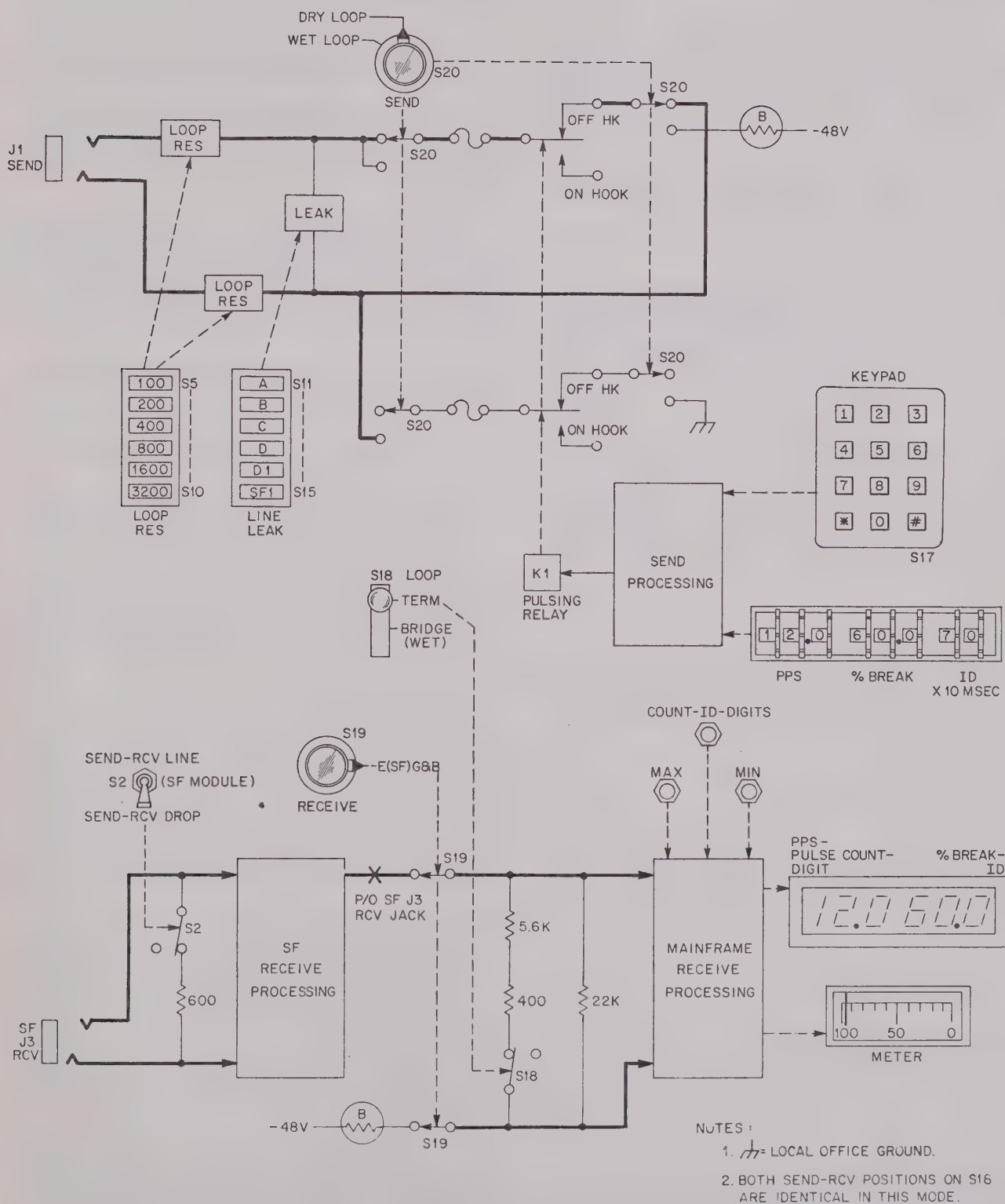


Figure 4-26. Sending On The M Lead While Receiving On SF

4.86 SENDING LOOP AND RECEIVING SF OR VICE VERSA

4.87 The 1260A provides for checking such items as loop-to-SF converters and SF-to-loop converters. See Figures 4-23 and 4-25 for illustrations that show the relationships between the jacks and internal circuits that can be measured. To operate in mixed modes, perform the following steps.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.

2. Verify that the circuits under test are idle.

3. **To send loop and receive pulsed SF**, first insert a 310 plug into the LOOP SEND jack and connect the other end of the cord to the circuit to be pulsed. Then, insert another 310 plug into the SF RCV jack. Connect the other end of the cord to the circuit to be measured.

4. **To send steady-tone or pulsed SF and receive loop**, first insert a 310 plug into the SF SEND jack and connect the other end of the cord to the circuit to be pulsed. Then, insert another 310 plug into the LOOP RCV jack. Connect the other end of the cord to the circuit to be measured.

NOTE

If a set of pulsing contacts is **not** conveniently available, switch in the 1260A's internal A-relay by setting the E&M/LOOP switch to LOOP A-RELAY.

5. **To send steady-tone or pulsed SF**, turn the DEV FR SND TLP dial on the SF module to the desired output level.

6. Set the SF SEND RCV LINE/MON/SEND RCV DROP to either SF SEND RCV LINE or SF SEND RCV DROP as required.

7. Set the E&M/LOOP switch to LOOP TERM if a low impedance is required.

8. To terminate the circuit under test in a high impedance, set the E&M/LOOP switch to LOOP BRIDGE.

NOTE

Do **not** bridge on dry loop. If a dry loop is bridged the 1260A shows a continuous off-hook on its analog meter and does not respond to an input. The 1260A will also interfere with a call in this mode.

9. **To send loop and receive pulsed SF**, turn the SEND dial to either DRY LOOP or WET LOOP and the RECEIVE dial to E (SF) G&B.

10. If sending loop, depress the appropriate LOOP RES and/or LINE LEAK pushbuttons as required.

11. **To send steady-tone or pulsed SF and receive loop**, turn the SEND dial to E (SF) G&B and the RECEIVE dial to either the DRY LOOP or WET LOOP position as required.

12. Set the PPS/% BREAK/ID X 10 MSEC thumb-wheel switches as required. Refer to paragraph 4.38 and Figure 4-3 for pulse speed and percent break conditions. Refer to paragraph 4.20 for ID time considerations.

13. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

14. To send steady-tone SF set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK.

15. To send a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT.

16. When receiving a continuous stream of pulses, the digital display will show the average pulse speed and percent break after 10 pulses have been received and measured. The display will update automatically every 10 pulses thereafter.

17. When either the MAX or MIN pushbutton is depressed separately, the display will indicate the maximum or minimum speed and percent break measured since the last time the display was cleared. When either pushbutton is depressed, both the speed and percent break are displayed together. This does not imply that they necessarily occurred during the same pulse.

18. If desired, use the METER ADJ control to set the meter indicator-line to agree with the digital display. The meter can be used to observe short-term perturbations in the received percent break. It also provides on-hook and off-hook indications.

19. To output dialed digits using the keypad, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL.

20. To send, receive, and measure dialed digits in real time, refer to paragraph 4.15 for a discussion of the considerations when sending and receiving dialed pulses.

21. To send, receive, and measure dialed digits using the dial-from-memory feature, refer to paragraph 4.22 for an explanation of the operation of this feature. Also, refer to paragraph 4.15 cited above for a discussion of the considerations when sending and receiving dialed pulses.

4.88 SENDING E&M AND RECEIVING SF OR VICE VERSA

4.89 The 1260A provides for checking such items as E&M-to-SF converters and SF-to-E&M converters. See Figures 4-24 and 4-26 for illustrations that show the relationships between the jacks and the internal circuits that can be measured. To operate in mixed modes, perform the following steps.

1. Turn the 1260A power switch ON. The red lamp in the center of the switch should light.

2. Verify that the circuits under test are idle.

3. **To send E&M and receive pulsed SF**, first insert a 310 plug into either the E&M DROP jack to send on the E lead toward the drop, or, the E&M LINE jack to send on the M lead toward the line. Connect the other end of the cord to the circuit to be pulsed. Then, insert another 310 plug into the SF RCV jack and connect the other end of the cord to the circuit to be measured.

4. **To send steady-tone or pulsed SF and receive E&M**, first, insert a 310 plug into the SF SEND jack and connect the other end of the cord to the circuit to be pulsed. Then, insert another 310 plug into the either the E&M LINE jack to receive on the E lead from the line, or, the E&M DROP jack to receive on the M lead from the drop. Connect the other end of the cord to the circuit to be measured.

NOTE

The 1260A provides an automatic busy-out in reverse direction for E&M testing.

5. **To send steady-tone or pulsed SF**, turn the DEV FR SND TLP dial on the SF module to the required output level.

6. Set the SF SEND RCV LINE /MON/SEND RCV DROP to either SEND RCV LINE or SEND RCV DROP as required.

7. Set the E&M/LOOP switch to E&M SEND RCV if a low impedance is required.

8. If receiving E&M only, (**not** sending), terminating the circuit under test in a high impedance is possible. Set the E&M/LOOP switch to E&M THRU + MON.

9. **To send E&M and receive pulsed SF**, turn the SEND dial to any of the four E and M positions as required and the RECEIVE dial to E (SF) G&B.

10. **To send steady-tone or pulsed SF and receive E&M**; turn the SEND dial to E (SF) G&B and the RECEIVE dial to any of the four E&M positions as required.

11. Set the PPS/% BREAK/ID X 10 MSEC thumb-wheel switches as required. Refer to paragraph 4.38 and Figure 4-3 for pulse speed and percent break conditions. Refer to paragraph 4.20 for ID time considerations.

12. Depress the MAX and MIN pushbuttons simultaneously to clear the display.

13. To send steady-tone SF set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK.

14. To send a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT.

15. When receiving a continuous stream of pulses, the digital display will show the average pulse speed and percent break after 10 pulses have been received and measured. The display will update automatically every 10 pulses thereafter.

16. When either the MAX or MIN pushbutton is depressed separately, the display will indicate the maximum or minimum speed and percent break measured since the last time the display was cleared. When either pushbutton is depressed, both the speed (and percent break are displayed together. This does not imply that they necessarily occurred during the same pulse.

17. If desired, use the METER ADJ control to set the meter indicator-line to agree with the digital display. The meter can be used to observe short-term perturbations in the received percent break. It also provides on-hook and off-hook indications.

18. To outpulse dialed digits using the keypad, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL.

19. To send, receive, and measure dialed digits in real time, refer to paragraph 4.15 for a discussion of the considerations when sending and receiving dialed pulses.

20. To send, receive, and measure dialed digits using the dial-from-memory feature, refer to paragraph 4.22 for an explanation of the operation of this feature. Also, refer to paragraph 4.15 cited above for a discussion of the considerations when sending and receiving dialed pulses.

